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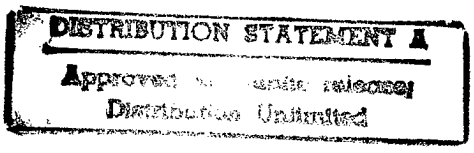
USSR: Science & Technology Policy



Science & Technology
USSR: Science & Technology Policy

JPRS-UST-89-015 *7 December 1989*

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Goals, Structure Discussed

907A047A Moscow SOVETSKAYA ROSSIYA in Russian 12 Nov 89 p 2

[Article by Academician of the USSR Academy of Sciences N. Dubinin; Academician of the USSR Academy of Sciences B. Raushenbakh; V. Rasputin, writer and USSR People's Deputy; Corresponding Member of the USSR Academy of Sciences I. Shafarevich; S. Zalygin, writer, chairman of the Soviet Association "Ecology and the World," and USSR People's Deputy; Corresponding Member of the USSR Academy of Sciences A. Monin, member of the board of the Association "Ecology and the World"; Doctor of Economic Sciences Professor M. Lemeshev; and V. Krupin, writer, under the rubric "What the Russian Academy Is to Be Like": "On the Threshold of the Millennium"]

[Text] In recent times the necessity of establishing the Russian Academy of Sciences has become obvious. And this is natural, inasmuch as many aspects of science are connected with not only human, but also specific regional and national problems. The development of such scientific directions is vitally important for the corresponding regions. The academies of sciences of the union republics are called upon to develop precisely these directions. However, such an academy does not exist in the largest republic of the Soviet Union—the RSFSR, and this is having a painful effect on the development of the entire country. The problems, which are connected with the serious demographic situation, in which the Russian people and other peoples of the RSFSR have found themselves, the fate of small peoples and their interrelations with the Russian people and with each other, the scientific bases of major nature-transforming projects, which are being implemented in the RSFSR, and many other problems are being elaborated within the USSR Academy of Sciences in isolation from the specific conditions of our republic and without proper consideration of its real interests.

Whereas the question of establishing the Russian Academy of Sciences is encountering practically unanimous support, the type of the future organization, its structure, and its functioning are still absolutely unclear. At the same time it is necessary to settle these questions precisely now, simultaneously with the fundamental question of the establishment of the Russian Academy of Sciences. After the basic organizational decisions are made, it will be practically impossible to change the nature of the future institution, which is incorporated in them.

The successes of science and its national economic importance also should not hide from us the negative role, which, unfortunately, science played and is continuing to play in the formation and, to put it more precisely, in the destruction of the world that surrounds us. We are convinced of the lofty destiny of science, but the radical revision of the concepts, which are the basis for our civilization, and the revision of its moral principles are required for the realization of this destiny. Therefore, it is necessary to formulate anew both the program and goals and the organizational structure of the Russian Academy of Sciences.

The goal of the Russian Academy of Sciences is the development of science, culture, and education and the utmost promotion of the saving, preservation, and flourishing of the nature of the RSFSR and the peoples who inhabit it.

It should be a matter of the development of the program "Russia of the Third Millennium." In our opinion, the following directions, to which inadequate attention is being devoted at the USSR Academy of Sciences, should be the basic ones in the activity of the RSFSR Academy of Sciences.

The ecological directions should include the study of the natural environment of the RSFSR and the means of its preservation and reproduction. There are included here:

—The study of the native natural resources of the RSFSR. The questions of soil science, geology, and geography, which are oriented toward the problems of the proper coexistence of man and nature.

—The development of new, ecologically safe, waste-free, resource-saving, and energy-saving technologies.

—The restoration of the biosphere and its return to an ecologically clean, healthy state; the preservation and reproduction of soils and the plant and animal world.

—The ecology of agriculture. The effect of ecological factors on man and the ecological problems of medicine.

The humanities directions should contain the following sections:

—Questions of the history of the RSFSR, the peoples inhabiting it, and their interrelations. The study and preservation of historical monuments.

—Ethnography and demography. The questions of the revival and development of national culture and the way of life. The problems of population for various regions of the RSFSR.

—Linguistics and literary criticism. The revival and development of domestic philosophy, culture, and esthetics.

—The problems of federation. The interaction of various peoples, their cultures and economic traditions.

—The constitutional law aspect. The assurance of social stability. The crisis of values and crime. The analysis of the consequences and the prediction of the change of the type and nature of production and the level of employment.

—Economics. The questions of the application (and applicability) of the economic and technological know-how of other countries. The comparative study of various models of development, as well as the national economic systems of the peoples of the RSFSR.

—Education. The questions of training and the national school.

Of course, the activity of the Russian Academy of Sciences should not be confined to just these directions.

An expert council, which will be called upon to block the way for planning, designing, and production, which do harm to nature and the population, should be organized within the Russian Academy of Sciences. The establishment of educational institutions, which are connected with the Russian Academy of Sciences, should also be envisaged.

The structure of the Russian Academy of Sciences should be formed anew, not by detachment from the USSR Academy of Sciences or any affiliates of it, in order not to inherit the negative traits that are characteristic of these institutions. Megalomania, the inflation of staffs, the merging of the Academy of Sciences with the economic apparatus of ministries and departments and with the party apparatus, bureaucracy, the ingrained hierarchical structure, which gives rise to the aspiration for ranks and titles, and so on serve as typical examples of such negative traits.

We propose an organizational structure of the Russian Academy of Sciences, which was designed not as a collection of scientific research institutes, but as scientific collectives, which would regroup after the completion of research on one theme or another. Here it is advisable to have some fixed number of scientific headquarters, which should be very moderate—incomparably fewer than at the USSR Academy of Sciences. Efficiency should be achieved by the very careful selection of associates. When organizing the Russian Academy of Sciences the most advanced world experience, which has justified itself in practice, should be taken into account.

The budget of the Russian Academy of Sciences should be allocated from the assets of the RSFSR Council of Ministers. This budget should ensure sound scientific research.

The directions of research are specified by the council of the Russian Academy of Sciences. The council is elected by the scientific associates of the Russian Academy of Sciences. It is not accountable to any other organization. It is also advisable to include in a specific proportion on this council, in addition to scientists, figures of culture and art, whose opinion is important for the activity of the academy. The council stands for reelection every 5 years. There is conferred on the members of the council the title "Academician of the Russian Academy of Sciences," which they retain for life. Membership in the Russian Academy of Sciences should not be remunerated and should not involve any material privileges.

For the establishment of the Russian Academy of Sciences the Committee for Science, Public Education, Culture, and Training of the RSFSR Supreme Soviet by means of the most extensive and careful consultations with many scientific and public organizations appoints the council of founders of the Russian Academy of Sciences, the goal of which consists in the selection of its future associates. It is necessary to carry out the establishment of the Russian Academy of Sciences in stages, over a sufficiently long period, with the gradual increase of the number of problems, members of the academy, and associates and the budget. At the initial stage the scientists, who will be able to set up hardworking collectives in the directions listed above, should be selected. It is necessary to do this gradually, bearing in mind actually working prominent scientists and without trying to see to it that all the directions listed above would simultaneously be represented uniformly. Moreover, the very specification of these directions should take place in the process of organization.

The establishment of the Russian Academy of Sciences will contribute to the elimination of the difficult unequal position, in which the Russian people and the other peoples of the RSFSR have found themselves, and to their healthy development on the basis of national traditions.

Reorganizational Problems Discussed

907A0047B Moscow SOVETSKAYA ROSSIYA in Russian 12 Nov 89 p 3

[Article by V. Zenin, chief engineer of a physics installation and deputy of the Protvino Settlement Soviet, under the rubric "What the Russian Academy of Sciences Is to Be Like" (Moscow Oblast): "The Mission of Science"]

[Text] They waited impatiently for this discussion. It is a matter of the establishment of the Russian Academy of Sciences. The principles of its formation, which were set forth by Academician N.N. Moiseyev, for example, the establishment of four or five large departments, do not arouse doubts. The merging of this academy with the academies of pedagogical and medical sciences is also absolutely necessary. Only common work will make it possible to avoid extremes and the narrowness of individual offshoots. Here scientists of various types can become a kind of public monitor of narrow specializations.

However, so that the discussion of the resurrection of the Russian Academy would be more objective, it is necessary, in my opinion, to outline its goals clearly, which will determine both the structure and the strategy. In addition to the obvious tasks (the increase of the effectiveness of research, contact with the national economy, and so forth) the halt of the barbaric treatment of nature (a matter of life and death), the revival of the self-consciousness and culture of the people and their historical memory, the increase of morality, and the improvement of the spiritual and physical health of people should become the most important goals. What have the existing academy, the prevailing educational system, and medicine given us, if we examine their activity from such a point of view? Not only the scientific community, but also all the people should answer precisely this question. Without laying claim to incontrovertibility, I will express only my own opinion. I am convinced that all the present academies, more broadly all scientific organizations, being under the thumb of departments, have not coped with their basic mission.

There are many examples of the barbaric treatment of nature, but I will recall just one: as a result of the antiscientific treatment of the land we under the guidance of "the most advanced" science are destroying humus a thousandfold more rapidly than the "ignorant" peasant of prerevolutionary Russia. This fact alone is sufficient to disband the pompous USSR Academy of Sciences. I also propose to do this first of all. Moreover, the Russian Academy with its departments will have to perform all the real work on the territory of the enormous republic. The other republic academies will also begin to do this. So that the need for such a superstructure as the union academy completely disappears. Only a small coordinating council, which is formed of representatives of the republic academies and works, perhaps, within the USSR Supreme Soviet, is necessary.

Another serious question is the fate of departmental institutes, several of them still also have the status of enterprises. Working for 25 years in the system of similar institutes, I know how many unfounded, unjustified expenditures these "whales" consume. "Departmental science" has led to the main misfortune—the morality of scientists has been undermined. Various increments for "peculiarity" and "secrecy" and "classified" themes of dissertations have corrupted many people, some for the sake of protection are willing to prove that gasoline is more useful than milk. In speaking about my fellow scientists, I am far from a sweeping accusation of scientists. Among them there are many honest and even courageous people. I am speaking about the system which corrupts scientific personnel.

And the last question is the national question. In speaking about the goals of the new academy, it is necessary not to forget the equal representation of scientists of all the peoples of the RSFSR in conformity with their total number. It is necessary not to forget that as a result of the policy, which was pursued in the 1920's and 1930's, many Russian scientists were scattered. In practice the slow formation of a new Russian intelligentsia began only in the postwar years. Not without reason do some representatives of the "elite" speak with contempt about intellectuals in the "first generation." It is necessary merely not to forget the reasons. Therefore, the time has come to rectify the mistakes of past years—to help the Russian and other peoples of the RSFSR in the revival of their scientific, spiritual, and physical forces. This is a noble goal for the academy.

New National Committee Responsible for "Critical Science"

907A0049A Moscow NTR: PROBLEMY I RESHENIYA in Russian No 20, 20 Oct 89 p 3

[Interview with Doctor of Technical Sciences Zhann Fedorovich Zinchenko, cochairman of the USSR Committee of Public Evaluation, under the rubric "Panorama": "The Institution of 'Critical Science'": date and place not indicated; first three paragraphs are NTR: PROBLEMY I RESHENIYA introduction]

[Text] The constituent meeting of the USSR Committee of Public Evaluation was held the other day at the Cultural Center of the Academy of Pedagogical Sciences. The USSR Union of Scientific and Engineering Societies, the USSR State Committee for Science and Technology, the USSR Academy of Sciences, and the USSR Federation of Engineers acted as the founders of the Committee. Leading scientists of the country, USSR people's deputies, and executives of the largest scientific production associations assembled.

The Charter of the Committee was adopted, its collegium was elected, Corresponding Member of the USSR Academy of Sciences V.L. Makarov and Doctor of Technical Sciences Zh.F. Zinchenko were elected cochairmen.

A cochairman of the Committee tells about the prerequisites, reserves, and goals of the work of the new public organization of professionals.

Our committee is being established, as medical personnel say under extreme conditions, in accordance with the "vital signs," Zhann Fedorovich Zinchenko says.

"To eliminate the ecological costs when formulating major scientific, technical, and engineering projects, it is necessary to organize properly a social evaluation with the participation of the community at large," it was emphasized in the decisions of the 19th All-Union Party Conference.

In the developed countries of the West the institution of what is called "critical science" was formed long ago for such work. For example, in the United States the federal government alone annually orders various evaluations and consultations in the amount of $2 billion. The U.S. Government does not examine a single project without considering the evaluation of the most authoritative organization in the States—the American Association of Engineering Organizations.

One of the founders of the Committee—the USSR Union of Scientific and Engineering Societies—has a large backlog of orders for evaluation and consultations—of soviets of people's deputies, from party organs of all levels, enterprises, and scientific organizations. For example, President of the Ukrainian SSR Academy of Sciences B.Ye. Paton ordered an evaluation of programs and work on new materials.

The union government addressed to the Union of Scientific and Engineering Societies the request to make an evaluation on various parts of the Tengiz Project. The firm of Hammer is drawing it up jointly with Japanese and Italian partners.

The work, which we are beginning, will require of us a highly principled civic position.

Financial Mechanisms for Encouraging Innovation Discussed

907A0036A Minsk KOMMUNIST BELORUSSII in Russian No 10, Oct 89 pp 77-83

[Article by KOMMUNIST BELORUSSII science commentator S. Dobrinevskiy, junior scientific associate of the Institute of Physics of the Belorussian SSR Academy of Sciences, under the rubric "Education. Science. Culture": "Money for the Scientific and Technical Revolution, or the New Mechanisms of Financing in the Innovation Sphere"]

[Text] "Child's" questions, as is known, are most unpleasant. In recent times they have ceased to number among demagogs those who ask them. It is rather quite the reverse—what we have grown accustomed to consider obvious, more and more often conceals the most serious problems.

Why are scientists needed and for what does society pay them money, is a classical "child's" question. The long years of "equality" of several types of labor, which in principle cannot be equal, had the result that it became even somehow strange to discuss this theme. Why, you will say, are yardmen, for example, needed? They just sweep the streets, and society pays them for this socially useful labor. Here are scientists—they make "fundamentally new scientific and technical developments," for which they also receive "in conformity with the quality and quantity."

All of us have probably grown accustomed to such logic. And the manner of describing scientific achievements differed in no way from the manner of describing the achievements of a water management or petroleum and gas complex. "The third blast furnace was started up.... The fifth unit provided current.... Discovery number 322 was registered...." In general, the state registration of discoveries has become the apotheosis of a similar system of the planning of "the scientific product" (let the reader, who is far from academic spheres, not mock, the remarkable term "the scientific product" to this day happens at times to be in vogue). The author of a discovery cannot call himself the author of a discovery without the appropriate certificate, while, on the other hand, the certificate gives its holder all the rights absolutely irrespective of the true value of some scientific works or others.

Nevertheless, it is still necessary to reflect a little on the actual use and effectiveness of scientific research, for a financial crisis has struck academic science.

In contrast to yardmen, who also under perestroyka punctually receive their wage for socially useful labor, learned people were directly on the verge of bankruptcy. At the beginning of this year there were days, when in the bank accounts of the largest institutes of the Belorussian SSR Academy of Sciences it was impossible to count even hundreds of rubles. Items "concerning the financial situation" appeared all but for the first time on the agendas of scientific councils. Moreover, the crisis originated not through the fault of some careless bureaucrat, who forgot to enter the necessary figure in the column "spending on science," but because of the extensive dissemination of the new economic principles—self-financing and full cost accounting.

How did this happen?

During the stagnation times of fond memory (precisely fond, for then the problems of assets and limits existed, but the problem of money practically never arose) the financing of academic science followed two basic channels—from the budget and by means of direct economic contracts with enterprises. The question, of what kind of benefit can the Academy of Sciences be, was not discussed at that time, since "child's" questions were not in fashion. It was later that various comparisons of the economic impact from the activity of the Academy of Sciences and, for example, the national income of the entire republic began to dot the pages of newspapers and journals. I will not reproduce here these calculations in detail, but for an example I will name one figure. During the years of the 11th Five-Year Plan an economic impact of about 800 million rubles was derived, while the expenditures on scientific research work, for example, in 1987 came to only a little more than 50 million rubles. It turned out that "the docents with candidates" not only are spongers, but in addition are also feeding many others.

Of course, no one believes in these 800 million rubles, and it is not worth discussing this specially. But the thing, to which in reality it will not hurt to direct attention, is the fact that the actual system of the financing of science was completely different, and the main division in it was by no means between economic contractual and budget money.

The main division, as in all other economic relations, was between cash and noncash [beznalichnyy] money. Cash constituted what is called "the planned wage fund," which was approved somewhere very high up and had extremely little in common with the number of budget-carried themes or the wealth of clients. I have in general the suspicion that this fund was formed according to some scandalously primitive principles. For example—"this will be sufficient so that our dear scientists would live approximately the same way as yesterday, or even a tiny bit better."

Noncash money, of course, could be spent only for the acquisition of equipment, scientific instruments, furniture, and so on. But (what has also been repeatedly described) this money was not at all money, that is, a universal commodity equivalent. Instruments and equipment were not sold, but were distributed, moreover, the allocated assets in all cases were less than the amount of money. It is exceedingly fundamental that it was precisely in all cases. Owing to this the client parted with money easily—he also had, after all, less assets than money.

Thus, in reality what is called "financing" was not financing at all. The wage was allocated according to a plan, meager quantities of poor scientific equipment were distributed according to a plan, successive discoveries were registered according to a plan.

Among journalists it has become a tradition to lament that the perestroyka of economic relations is proceeding extremely slowly. But here the system, which seemed such a well-balanced one, collapsed literally in an hour.

Back 1-1.5 years ago nothing presaged the impending end. But the first gravediggers of "extrafinancial financing" appeared precisely at that time. These were the centers of scientific and technical creativity of youth. It is not necessary now to explain what these are. But initially it seemed that latest "Komsomol fad" would soon die, just like everything Komsomol had tried for a long time and unsuccessfully to establish in the economic sphere. However, not merely did the centers of scientific and technical creativity of youth not die, but they irrevocably ruined the entire established system of the financing of science. A single, but essential and fundamental property was sufficient for this—everything, which is in the account of the center of scientific and technical creativity of youth, is money. Take if only the wage—the most perspicacious of the "protectors" back a year ago made a fuss about the fact that, they said, the centers of scientific and technical creativity of youth had been given the right to freely convert noncash money into cash and this supposedly would immediately plunge us into the depths of inflation. (Now even the most unperspicacious have also joined them, and the notion of "a powerful channel of the influx of money not backed by goods" has become dangerously widespread. Later we will talk about it in greater detail.)

But it is not at all a matter of this notorious "transfer." The point is that this planned wage fund itself does not exist at the center of scientific and technical creativity of youth. It is not the state bureaucrat who decides how much some junior scientific associate will receive for his work, but whoever orders the development and pays the money. Full-valued (and often quite a few—a little more than the basic wage) rubles appeared in the pocket of the junior scientific associate not according to the plan, but according to the whim of the buyer, who needed something that this young person knows how to make. The very market, which liberal economists and starved consumers so wanted, emerged.

But engineering creativity is a special area. There the product can be prepared for sale very, very quickly. And the path, which physical production will have covered, perhaps, in about 5 years, in the innovation sphere has in fact already been covered. An enormous number of developments have been dumped on the market. This, perhaps, is in general the only area in our economy, in which the market is already operating. And inasmuch as we are counting on such a future for the entire economy, it is worth looking a little more closely at this oasis.

The centers of scientific and technical creativity of youth are no longer the only sellers. Scientific and technical cooperatives already control a substantial share of the market, and they feel quite confident. Here, for example, is the Medinfoservis Cooperative. It has its own permanent selling floors in Moscow, in the Pribory Store on Nakhimovskiy Prospekt—it sells quite good computer graphics software and external device controllers for personal computers. The prices are quite fair and are not higher than state prices. The Terminal Cooperative supplies reference information systems for the same kind of computers, the Entri Cooperative supplies database management systems....

In general, there are a large number of examples. One has only to look at the last page of the bulletin NTR: PROBLEMY I RESHENIYA (advertisements of scientific and technical firms, cooperatives, and centers of scientific and technical creativity of youth are published there) to understand that the dictation of the producer to a large degree has diminished, if one were to say no more. But here state institutions have also received the right to spend on the wage a fixed percentage (about 3 percent) of the amount of economic contractual operations irrespective of the "planned funds," which it is easy to understand—they would otherwise simply not withstand the competition. Innovation activity has proved to be extremely profitable—nearly all the centers of scientific and technical creativity of youth, which were opened about a year ago and more, have already passed the 1 million ruble mark in the volume of work.

But what kind of bearing does all this have on the financial crisis of scientific research, you will ask.

But a most direct one. The "pseudomarket," which essentially was the system of centralized distribution, suddenly became (even though with limitations, even though not fully 100 percent, but still it became) a genuine market, and the secondary division between state budget and economic contractual money appeared in the forefront. Former wealthy clients found that they can choose (the dictation of the consumer!) and choose from several versions.

First, it is possible to keep the money for oneself. Now it is possible to buy something with it, for example, personal computers. (Before the appearance of intermediary firms this was impossible.) For example: an IBM PC costs on the market about 50,000 rubles, it is possible to buy a PS-2 (this is a good 32-bit computer), if you are lucky, for about 80,000-100,000 rubles. The money, of course, is a lot, but what will its owner choose—an economic contract with an academic institute (read: a fake effect of many thousands of rubles) or a real American computer?

Second, it is possible to order work from cooperative members or a center of scientific and technical creativity of youth. The same people will perform it as in the case of the "state" economic contract, but at rates that are, as a rule, one-third to one-half as much due to the low overhead and the high coefficient of the conversion of noncash money into a cash wage. Not to mention the fact that previously it was not that easy to conclude even an awfully expensive economic contract—all the potential contractors were overloaded.

Third, it is also possible in general to put this money in one's own pocket. For example, to perform all the work independently, but to convert the money into cash by any legal means—either by salary and bonus increments, by a

contract through a center of scientific and technical creativity of youth with oneself, or in general however you like. (By the standards of recent times they would have regarded this in general as a financial crime, and besides the well-known Estonian scientist I. Khint was condemned "in a big way" for approximately such economic contractual activity.)

This is the market. And, as on any market, on it there are far fewer clients than the potential performers of work would like. If you also consider that due to the reduction of military spending many "money bags" suddenly became empty and if you consider that both the reduction of the spending of the former Ministry of Land Reclamation and Water Resources and the cancellation of many other cyclopean projects will serve "economic contractors" right, relief is not foreseen.

And here a "child's" question arises: For what then are scientists needed, if there is not enough state budget financing even for the wage, while economic contracts have ceased to be a mere piece of paper? P.A. Apanasevich, director of the Institute of Physics of the Belorussian SSR Academy of Sciences, recently wrote that luckily for associates of the institute many economic contracts during the stagnation times coincided in themes with the scientific interests of laboratories. This is probably not entirely so. Probably during the stagnation times clients simply treated more leniently the fact that for their money (from which all the same no good came) "academicians" engage in their own research, "which no one needs."

There will no longer be such a thing. For his money the client wants to obtain a specific benefit. Not only is there not enough money, one will still also have to do work for it.

It would seem that this is the same situation, which the disciples of the free market and the irreconcilable enemies of "vain" spending on "pseudoscience" anticipated.

But are we not hurrying to rejoice?

[Boxed item: It was envisaged by the socialist obligations to prepare and send to the press 82 monographs and 2,718 scientific articles; 82 monographs and 2,791 articles were actually sent to the press. (Report of the Presidium of the Belorussian SSR Academy of Sciences, the party committee, the trade union committee, and the Komsomol committee)]

It would be incorrect to believe that science and "the generation of new developments" are the same thing. The peculiarity of science is the fact that it is unprofitable. While what is being dumped on the market of scientific and technical developments is a real use value.

Let us dwell on this "market science," on the last page of the bulletin NTR.

New materials, technologies, and computer programs in the final analysis bring the buyers a quite large gain. It is possible to accept this point without any special proof, because there is no and can be no "planned attachment of suppliers" on the free market. If the manager of an enterprise intends to buy something from a cooperative, by overcoming all the artificial bans and restrictions, it would be absurd to infer that he does not need this "something" that much. And there is another starting point: individual buyers absolutely do not need new developments given the present state of the consumer market, when means of production are not sold to private owners.

Thus, the advertising page of the scientific and technical newspaper is new useful developments, which individual, cooperative, and state producers are offering to enterprises, counting on making good money on these developments. We actually have before us the acme of dreams, about which the KVN supporters once said aptly—"go to the world market and purchase there if only something." the only difference is that not dollars, but ordinary Soviet rubles are used on this market. That, about which we dreamt, was close at hand. How is trade going?

[boxed item: "Enterprises should regard scientific ideas as a commodity, the value of which depends on the price of the scientific design and the future efficiency of the final product." (From an interview of President of the Belorussian SSR Academy of Sciences V. Platonov with the journal KOMMUNIST BELORUSSII, No 6, 1988)]

With much difficulty. The first financial successes of the centers of scientific and technical creativity of youth and scientific and technical cooperations should not mislead anyone, for the present there are still too many obstacles. And, perhaps, the most serious obstacle is the need to pay cooperative members and any other "self-seekers" from one's own wage.

This is so extraordinary a phenomenon that it is worth telling about it in greater detail. As is known, every enterprise has funds, which have a direct relationship to cash—for example, the wage fund—and "noncash" funds. And everything was fine, while equipment was purchased by order for "noncash" money. "Trade without trade," which was already discussed, was the result.

But, however paradoxical, if an enterprise would want to purchase exactly the same commodity from a cooperative, it is no longer possible to do this by means of "noncash" money! If you suddenly imagine that the director of a plant decided to "supply himself" only from cooperative members and to purchase from them absolutely everything—raw materials, machine tools, tools (the situation is not that unrealistic, cooperatives can produce and are already producing all this), he will be throwing 100 percent of his noncash money into the wind. It is possible to spend it only in the state sector! It turns out that whoever has decided to use the services of the free market, cannot count on anything except his own wage.

Thus far I have not succeeded in seeing the circulars, which would prohibit settlements with cooperatives with noncash money, although all planning and financial workers unanimously claim that such circulars exist. But it is a question, in the end, not even of them, although this is also interesting, but of the widespread line of reasoning of approximately the following sense: "Cooperative members will convert our noncash money into their own cash wage, but it is not backed by consumer goods. Thus, settlements

with cooperatives from noncash funds will intensify inflation. They would be better off dealing with consumer goods." Here, for example, is a report in the newspaper PRAVDA for 2 May 1989, in which K. Lipkovskiy and Yu. Sidorenko conclude: "Cooperatives, having been deprived of the rich orders that they are now tearing from scientific research institutes, will engage in their direct business—the development of science-intensive products for the needs of the population."

It is an extraordinary argument. As if the state enterprise will not convert your noncash money into its own cash wage. Let the plant or scientific research institute spend even a small percent from the monetary receipts on the wage of its associates. But it buys something for the rest of the money, hence, the producer of this "something" receives a wage.

At our accounting offices they do not write off a ruble for no special reason, and it is possible to reduce all types of expenses of enterprises to just two: the wage and the purchase of what has been produced by others. As is known, even the payments to the state budget or the deductions for the benefit of the notorious ministries and departments are used for the same thing—either for the wage of the ministers or for the purchase of a finished product from other enterprises. Living labor and embodied labor. Material costs and the remuneration of manpower. Call it what you like, but all the money not in the form of case has been taken into account, and it is no "symbolic" money. It either will be paid today or tomorrow (the wage) or was already paid yesterday (a previously made product). The labor nature of value is what this is called. The "simple product" of Adam Smith.

And the regrettably famous 100 billion ruble negative balance of the state budget means precisely this—the payment to people (with allowance made for previous debts to them) of 100 billion rubles more than was received in a year.

[Boxed item: "How is it possible to explain the opportunity, which has been afforded state enterprises, to settle accounts with production cooperatives from the funds for the development of production, science, and technology? For this noncash money, which in the national economy is mainly of accounting importance, is transferred to cooperatives in case of a tax rate of 3-5 percent in cash. Does not the basic source of the large amount of money, which is not backed by goods, lie here?" S. Tkachev, instructor of the Minsk City Committee of the Belorussian Communist Party. (The newspaper VECHERNIY MINSK, 14 April 1989)]

Why is it so terrible to pay this pseudononcash money to cooperative members? Because it is already earmarked. The state enterprise actually will convert a small part of it into cash, the rest will be used to pay for "components." So, these "components" either have already been produced or have been planned for production, and the money has already been paid to their producers. This is actually the same money which cooperative members had conceived to take for themselves. It is already weighing down somewhere in department stores with its unbacked bulk on the half-empty shelves.

Here is just one example. The Central Design Bureau of the Belorussian SSR Academy of Sciences developed in accordance with an order of the Institute of Physics an optical spectrum analyzer with matrix recording—those who deal with spectroscopy know that the instrument is extremely necessary and extremely scarce. The total amount of the contract came to 107,000 rubles. Of them the wage of associates of the Central Design Bureau is 40,000 rubles and the overhead (in which the wage of administrative personnel constitutes a significant part) is another 40,000 rubles. Incidentally, it is a rather good coefficient of "the transfer of noncash money into cash," is it not? What is one to say after this about cooperatives?... Toward the end of the work it turned out that the submitted mockup was inoperative. But the 107,000 rubles had floated away, they had been paid by stages, and it is practically impossible to return them. And all of them had been converted into cash—precisely all, because even the smallest resistor in this nonoperating mockup is already considered purchased, while the wage of its producer is legitimate.

In this situation it is quite difficult, but necessary to appeal for the repeal of the secret circulars "not a kopeck to cooperatives from the noncash money." First, because this is the only means of existence of the market of scientific and technical developments. It is necessary to look at things soberly and to understand: settlements for new equipment and technology from one's own pocket are sooner an exceptional phenomenon than a normal phenomenon. The production development fund, however you turn it, is also intended precisely for these settlements. Second, because one will all the same have to acknowledge sooner or later the existence of an inordinately large amount of produced output (embodied labor), which now no one needs, although its "authors" received their wage long ago. And some day one will have to spend the money once again—for the purchase of another product, which will prove to be really useful. It is frightening even to suppose what a large amount of embodied useless labor in this case is disappearing from the commodity turnover, but one cannot avoid this.

The economy all the same is surprisingly organized—the first crisis, to which even the limited permitting of a free market is leading, has acquired the familiar traits of the crisis of the overproduction of commodities. It would probably also be more effective to combat it with the same methods, with which they have always combated crises of overproduction in the capitalist countries, where there is a little more experience in this area. It is necessary to get rid to surpluses of unnecessary commodities as quickly as possible and with the least costs and to hurry up with the transfer of capital to the sectors, which guarantee normal marketing.

But is it necessary to try to depict the outwardly good-looking "correct" buying and selling of these surpluses as if they were the most popular commodities? I really do not know....

And there is another thing which it is worth saying about the state of the market of scientific and technical developments. The high income of those, who sell their ideas in this manner, upsets many people. But on this market there is competition! The overabundance of engineers and scientific associates affected economic relations in precisely such a unique manner. So might this be the actual price of a good design, the actual wage of a competent programmer? What, does it upset you? But this is a skilled person, he studied many years. Probably not in order to receive an income on the same level as an expert in the baking of buns. Any labor, of course, is honorable, but skilled labor should also be valued more highly.

And what is more. We, after all, always economized on technical developments, and how. Modest complaints of robbed intellectual property owners from abroad are just now breaking through to the pages of our press.

One should not forget that it is significantly easier to follow. Americans, as is known, paid for tens and hundreds of versions of computers and programs, which in the end perished in the competitive struggle. And it is already necessary to take this phenomenon into account. The numerous difficulties of the first sellers of ideas and developments are reliable evidence of that.

[Boxed item: "And if somewhere in our country a breakthrough does occur, it is not owing to the system of the organization of basic research, but 'in spite of' or even notwithstanding it. If we want to achieve success at the level of Nobel Prize winners, it is necessary to grant the individual freedom of creativity." Academician B. Raushenbakh. (The newspaper IZVESTIYA, 3 May 1989)]

Thus, for applied science the prospects have been specified. Perhaps, this is happening not in the forms, which many people expected, but the result is precisely that—new technologies and developments have become a commodity. Their developers have begun to live appreciably better. And when the authorship right is established, among them millionaires will absolutely appear, especially with our universal scale of any production.

Although scientific and technical cooperatives have violated "the purity of socialist principles," nevertheless they have quite rapidly improved the proportions of income from unskilled to highly skilled labor. The worries of many managers of enterprises, who spent assets and forces on the education of personnel and the selection of cadres, but now are left without them, are, in general, understandable. But the problem is not that at cooperatives skilled people receive inordinately more. This is the market value of manpower (given the fact that there are far more people, who want to work at scientific and technical cooperatives, than there are places, read if only the advertising supplement to VECHERNIY MINSK—"experienced electronics worker seeks a job in a cooperative"—hence, their income is obviously not set too high). In reality the problem is that many state enterprises do not have enough money for the support of skilled engineers and developers, that is why they are leaving for cooperatives.

But this will be counterbalanced. It is being counterbalanced already now, when the same procedure of settlements for scientific and technical developments, in accordance with which regardless of the planned wage fund the immediate performers can receive in cash up to a third or else more of the total value of the amount of work, has taken effect. This procedure took effect, perhaps, even too early, because state scientific research institutes and design bureaus still have left many "imposing plan" state orders, which now regardless of their true need for the market are being rapidly converted into crisp cash. Here, perhaps, there is indeed a real channel for the influx of excess monetary income. At any rate, the phenomenal increase of the wage at state scientific research institutes should be studied no less carefully than the increase of the income of cooperative members. For example, during 1988 alone the average wage at the Minskproyekt Institute increased by twofold and came to 600 rubles a month—even by cooperative standards it is rather good.

So that those, who are capable of bringing a competitive development into the world, can be rewarded rather well not only in a cooperative, but also at a state enterprise.

So, is economic perestroyka a complete success?

We will not hurry. Sensible economists warn: everyone cannot get rich simultaneously on the market. And among those, who will not get rich, by no means everyone is dead weight for society. As soon as developments became a commodity, we saw that far from every scientific idea finds a buyer.

That is also why unprofitable science remained without financing. What was completely obvious from the very start—that this is fundamentally different labor and the criterion of profitability is not applicable to it—we all the same began to check in practice. A miracle, nevertheless, did not happen, and the result was exactly the same as was expected. When the average scientific associate hears that the average wage in our country comes to more than 200 rubles a month, he merely sighs quietly.

A new mechanism of the financing of unprofitable scientific research in principle has already been proposed. This is the system of grants, which should be distributed on a competitive basis. But for the present it looks good only on paper.

First of all the fact that among these grants the bulk are once again money without the right to form a wage fund, is worthy of amazement. That is why not only will the income of associates of the corresponding laboratories not increase, but advanced equipment will also not appear there—for the centers of scientific and technical creativity of youth and cooperatives supply a significant portion of it, while with regard to them there is the same mysterious circular (which, by the way, it is also possible not to execute, if one has sufficient resolve, only where are they, the executives with sufficient resolve?).

But the main thing is that an atmosphere of free scientific creativity is being formed extremely slowly. This is precisely the case which is opposite to what is happening on

the market of technical developments, where literally in a year competition emerged as if from nothing.

But unprofitable science should also be developed, otherwise we will find ourselves back where we started tomorrow or the day after tomorrow. I would not risk suggesting that it is not at all a matter of economic regulators, at least not only them. Far from all people need money most of all in the world.

As soon as we acknowledge that "pure," "unprofitable," "basic" science lives by completely different laws than those, with which planning institutes or centers of scientific and technical creativity of youth deal, we will arrive at unexpected comparisons. For instance: Why in the Union of Writers is there no plan on the number of novels and poems, while at the Academy of Sciences there is a plan on the number of articles and monographs? Why do they call composers "the creative intelligentsia," while they call scientists together with engineers "the scientific and technical intelligentsia" (first, why together and, second, is it possible to think that they are an uncreative intelligentsia)? Briefly, let us compare the mode of life of a scientist and, for example, a writer. (In this, strictly speaking, there is no discovery, from time immemorial scientists have been considered the intelligentsia in exactly the same sense as both composers and artists. And only the era of comprehensive planning disturbed this natural connection, which it is now so difficult to restore. When the draft of the new charter of the Estonian SSR Academy of Sciences envisages the election of the most prominent figures of art and literature as academicians, we are surprised from mere habit, although there is nothing here to be surprised with.

Thus, in the world of art the problem of supporting unprofitable, but talented works also exists. Only this deception and this pseudofundamental requirement of "benefit for the needs of the national economy" do not exist there. But somehow I have not had occasion to see either in our newspapers or in Moscow newspapers an appeal to support materially the independent and talented scientist. The Academy of Sciences to the extent of its possibilities is attempting to do this, but the spirit of subordination is very strong there. Exclusively young people are participating in the competitions "for young people," heads of laboratories and directors of institutes are participating in the competitions for 100,000 ruble state grants. Yuriy Norshteyn as a person seeking money acts simply under his own name and this is sufficient, while scientists act without fail as representatives of the corresponding institutes and other institutions. Incidentally, this, perhaps, is also not bad. But there is, apparently, little good in the fact that there is again forming a single channel of the financing of scientific research and, what is more, such a channel as the Academy of Sciences, which distributes money among its own associates and, hence, cannot but take into account many factors besides the essence of their scientific ideas.

Is it mandatory that there is a single channel? But of course not. It simply turned out that way. It so turned out that the academy is not an association of the most prominent scientists (although precisely similar words are recorded in its charter), but a conglomeration of the most prominent institutes. The present leadership of the academy, it would appear, would also be happy to change this situation (incidentally, the system of competitive grants even in its present form is also beginning to work rather well, the authors of the best designs receive both scarce equipment and wage increments: as a whole for the Belorussian SSR Academy of Sciences this year neither more nor less than 11 million rubles of competition money were added to its own 42 million rubles), but not everything is within its power. Both a change of public opinion and a change of the status of the science worker are needed.

All the same scientists will not receive much money, at least in the immediate future, so long as our country is not among the wealthiest. But it is probably time to free them from petty "planned supervision." All the associates of the Belorussian SSR Academy of Sciences arrive at work by 8:30 (except Saturday and Sunday). Is this not nonsense? And is it not ridiculous that scientific associates time and again remember "library days," "creative leaves," and so on, and none of them can bring himself to reflect that in principle to count working time in hours—whether 41 hours or more or less—is absolutely absurd for those who are ordered "by the national economic division of labor" to engage in creativity? I am not even talking about agricultural work (65,000 man-days last year alone).

The competition in "pure science" is not in the least less fierce than in applied science. It is even more fierce—read for comparison the literary polemics of recent years, and you will understand what fierce competition there is among writers. This competition will force people to work better than any schedule and order will. Even now no one has abolished it—if not the wage, then the scientific reputation all the same forms in case of competition. That is perhaps why even under the "pass system" on days off nearly half of the associates of the Academy of Sciences are at work. (This, of course, is no guarantee of new scientific discoveries, it is often more useful to sit at home and think, but in principle in science you will not achieve much by doing little work—everyone, who has had serious successes, has confirmed this.) But if the system of competitive grants is established, the people wishing to receive them will all the more not take things easy, and it is possible to grant them freedom without any risk.

It will become clear in the immediate future whether the executives of scientific departments of the republic will take this path, because the situation is becoming threatening—the outflow of potentially talented scientists to fields, where the income is higher, is constantly increasing. It is only by more creative freedom that it is practicable to retain them.

Marchuk Pleads for More Funds for Basic Research

907A0035A Moscow POISK in Russian
No 25, 19-25 Oct 89 pp 1, 3

[Speech by President of the USSR Academy of Sciences Guriy Marchuk and excepts from discussion at the

meeting of the Committee of the USSR Supreme Soviet for Science, Education, Culture, and Training, prepared by Aleksandr Mitroshenkov, under the rubric "On the Agenda of the Supreme Soviet": "Science on Credit?"; first paragraph is POISK introduction]

[Text] "Projection-XXI"—that is what the report from the meeting of the Committee of the USSR Supreme Soviet for Science, Education, Culture, and Training, which was devoted to the budget of public education for 1990, was called (POISK, No 24). The thought that today it is very important not to allow the intellectual slowdown of the country, but, unfortunately, not everyone has an understanding of this, was heard in the statements of the deputies. The heated debates were continued during the next meeting of the committee, which was devoted to the budget of science for 1990. Here an unpleasant surprise awaited the deputies, who had gathered for a serious discussion of the prospects of scientific research in the Soviet Union, research that lays claim in many areas to world priority.... We are publishing fragments of the debate.

President of the USSR Academy of Sciences Guriy Marchuk:

I would like to return to June of last year, to the 19th All-Union Party Conference. M.S. Gorbachev in his report stressed that in our country undeservedly little attention is being directed to science, especially basic science. This thought was also heard in the statements of the delegates. The USSR Council of Ministers, in spite of the difficult financial position of the country, found at that time the opportunity to allocate an additional 400 million rubles. By what was the government guided? Modern production is inconceivable without the constant introduction of new technologies. The aviation industry is new composites which make it possible to develop more economical aircraft. Power engineering is safe nuclear reactors of a new generation. Computer technology is supercomputers with a speed of billions of operations a second and the establishment of an all-union data bank, in which all the information in the area of science, technology, and the economy would be stored. The medical industry is drugs which are capable of producing a revolution in the fight against cancer and AIDS. Finally, environmental protection is a global system of ecological security.... All these directions cannot be developed without basic research, while its cutback is equivalent to the slide of the country into stagnation.

As I have already said, in conformity with the decision of the government the USSR Academy of Sciences received for 1989 an additional 250 million rubles. And 150 million rubles were allocated to the republic academies. This made it possible to develop new scientific programs intensively. And today, when modern laboratories have been established and first-class scientists have joined in the work, it turns out that the 1990 budget has been reduced by these 400 million rubles.

Comrade deputies! This will affect the future of all Soviet basic science.

Let us turn to the figures. The USSR Academy of Sciences together with the academies of sciences of the union republics and higher educational institutions can dispose of only 5 percent of the assets that are being allotted for scientific research. Applied science and engineering, which for the most part are engaged in planning and design work, consume 95 percent.

Our 5 percent is 2 billion rubles. In the United States $15 billion are being spent a year on basic research. Moreover, during 1988-1989 it was additionally planned to spend another $3.4 billion on the reequipment of scientific laboratories of universities in the United States. So that the picture would be more accurate, it is necessary to take into account the purchasing power of the ruble with respect to the dollar.

The contrast in the instrument supply of science is just as striking. We have instruments and equipment worth 2.8 billion rubles, in the United States this indicator is fifteenfold higher. But today the role of scientific instruments is as great as never before!

The 400 million rubles of additional financing, which were allocated for 1989, raised the work of the Academy of Sciences to a qualitatively new level. Indeed, in 1988 priority academywide programs of basic research were formulated. In all there are 18 of them. They reflect six directions: the study of problems connected with the macrocosm—the investigation of the universe, the solar system, and earth; with the microcosm—nuclear research, the search for new elements; living matter, particularly the development of new biotechnologies; the development of instruments of the highest level of complexity; the comprehensive study of man from his genome to the social consequences of his activity. And here one of the most important programs is ecology. It is necessary not only to establish a system for the monitoring of the ecological situation in the country, but also to offer industry safe technologies. In agriculture, for example, we have to abandon pesticides, having gradually replaced them with biological methods of plant protection.

In contrast to past years institutes did not automatically receive assets for these programs. Scientific collectives submitted their research projects, and after quite tough competition the most successful ones were selected. Only half of the competition participants received support. Thus the leaders were revealed, they were found at institutes of Moscow and Leningrad, at the regional departments of the USSR Academy of Sciences, and at the academies of sciences of the union republics.

These 18 programs had actually become the core of the integration of all academic and, in many cases, VUZ science. The retooling of scientific centers had started. And suddenly in the budget for 1990 this money disappeared. The programs were on the verge of bankruptcy.

Following the persistent appeals of the Academy of Sciences to the government and owing to the constructive stand of Chairman of the State Committee for Science and Technology N. Laverov a solution to the crisis was found.

Taking into account that the 1990 budget "is bursting at the seams" as it is, the decision was made not to change this year its basic indicators for science. But here during 1990 itself it is mandatory to find the necessary assets and to allocate them for the development of basic science. What does this mean? In the months to come the Academy of Sciences will have to get credits at the State Bank and by means of these assets will have to finance scientific programs. That is what kind of life is in store for Soviet science—a life on credit. The Ministry of Finance agreed to repay it over the course of next year. There are the corresponding promises on this account, but only the support of the Committee of the USSR Supreme Soviet for Science, Education, Culture, and Training at present will serve as a sufficient guarantee that we will be able to continue the implementation of our most important 18 programs.

Comrade deputies! The Academy of Sciences asks you to support priority basic research in order to preserve the positions of Soviet science.

I would like to speak about another direction of work. The USSR Academy of Sciences also proposes to envisage allocations for space studies, having supported in so doing first of all those of them, which are of foremost scientific importance. Among them, in particular, is the probing of earth from space. It is a matter of the search for minerals, the development of space communications, the study of the weather, and the alteration of the climate. Studies of the processes, which are occurring on the sun and on earth, are required. They govern in many respects the state of the ozone layer of earth. This question is very urgent.

Further studies of the universe are necessary. We have come to the conclusion that now it is necessary to think not only about the solar system. The most complex galactic processes are capable of actively influencing our planet. It is necessary to understand what surprises the universe might give mankind in the foreseeable future. Precisely modern exploration by means of equipment, which is installed on satellites and the Mir orbital station, can cast light on this.

I will note that the problems of studies of the microcosm and macrocosm come into contact here.

Taking into account the importance of the scientific program of space research, I am requesting an additional 42 million rubles to be allocated for it.

I want to speak about another, in my opinion, very important problem—how to make the investment of state assets in science most effective.

What is the USSR Academy of Sciences today? This is about 300 scientific research institutions, at which 155,000 people work, of them 30,000 are candidates of sciences and 6,000 are doctors of sciences. There are approximately the same number of scientific associates at the academies of the union republics. How is one to reveal such a powerful intellectual potential? The direction of reform is akin to the transformations in our entire society—the democratization of the internal life of the scientific community is necessary. This also concerns the system of financing. I have already related that the assets for the most important scientific programs were allocated on a competitive basis. We have adopted the policy of the gradual transition from the financing of institutes to the financing of problems. In the next few years we will complete this work. The scientific collectives, which already today are prepared together with sectors to introduce their achievements in practice, should also receive priorities. Thus, precisely the collective of like-minded scientists is becoming more and more the leading scientific force. Assets should also get to it. The financing of jobs and individual scientists is not ruled out.

The new approaches should attract young people to science. In particular, starting in 1990 we are allocating 20 million rubles for young researchers. They can implement their projects, even if there is no money at their institutes.

It seems to me that the public distribution of assets is one of the most important conditions of perestroyka in science.

Then G. Marchuk answered questions. Several USSR people's deputies also stated their position. We are citing fragments of the statements.

[Question] I would like the budget of the USSR Academy of Sciences to be compared with the budget of scientific organizations of the defense complex of the country.

[G. Marchuk] Of the 77 billion rubles, which were allocated for defense in 1989, 15.3 billion rubles were spent on scientific operations in the military field. The budget of the Academy of Sciences is about one-eighth as much.

Once in a while a reproach will creep into the press—in the United States there are tenfold more Nobel Prize winners than in our country. In our country, as is known, since the war 11 scientists have received the prizes. In the United States about 80 have. I will not talk about the closed nature of our society for long years. Take the allocation of assets. There 7.5-fold more is being spent on basic research. This affects not only instrument supply, but also the prestige of the labor of a scientist. What, after all, is now happening in our country? The director of one of the Leningrad institutes told me a few days ago that 16 most talented researchers had submitted applications with the request that they be permitted to go to the United States for work on contracts. Why? We do not have equipment, we do not have currency for the purchase of foreign literature and for business trips. And besides that, there are the living conditions: there is no housing, you yourselves know the wage.... That is what the interrelations of science and society are like.

And here is what is annoying. We have quite a number of works which are setting the tone in world science. They can give the state unusually much already in the immediate future.

Let us take biotechnology. It seems that it has just recovered from the times of the devastation of genetics. But there are already several first-class works which surpass the world level. A fundamentally new method of genetic engineering has been developed at the Institute of Protein.

The possibility emerged to obtain proteins from paraffin, moreover, without bacteria. This makes the technology absolutely clean.

Our scientists have developed synthetic antigens, by means of which it is possible to diagnose and treat cancer.

We obtained unique results when developing human interferon. Similar work was performed in many countries, but even in the best results it was not possible to obtain an exact copy of human interferon. And whereas such preparations gave relief to some patients, the defense systems of others did not accept them. A preparation, which is absolutely analogous to human interferon, was developed at the USSR Academy of Sciences. But, note, industry does not want to undertake its production.

[Question] Thus, perhaps, should some enterprises, say, from the same defense complex, within the framework of conversion be transferred entirely to the Academy of Sciences? Then it would also be possible to implement academic know-how.

[G. Marchuk] This is simply a vital necessity. In the early 1960's N. Khrushchev removed about 100 institutes from the Academy of Sciences. Many of them in this time have lost their scientific level. In recent years the Academy has with difficulty brought three institutes back. Today we do not have enough scientific institutions of the technical and technological type, which we did have.

[Question] You spoke about the increase of the role of competitions. But we will not conceal the fact that in our country in many cases the competition not of ideas, but of people occurs. Among the Americans independent expert services have been developed, they are spending a lot of money on this. Do we have similar opportunities?

[G. Marchuk] Of course, the introduction of competitions is proceeding with difficulty. Much has to be altered. If we want to attract young people and talented scientists, we have to make the councils for the competitive distribution of allocations independent. But we also already have positive experience. For example, wherever new directions have emerged, competition has shown itself well. For example, in the area of high-temperature superconductivity.

M. Abasov, USSR people's deputy:

We are holding far from the first meeting and see distinctly that in the state proper attention to the basic sciences and the USSR Academy of Sciences does not exist. I believe that in our decisions we should clearly reflect the stand of our committee. The budget of the USSR Academy of Sciences should be increased.... Here it is necessary to develop an efficient mechanism of the financing of basic research. I have seen that enormous sums are being allocated for scientific development in the military-industrial complex, but here have not perceived a mechanism that links the defense sectors with the USSR Academy of Sciences. The Academy should not go there with an outstretched hand....

A. Krayko, USSR people's deputy:

I support the suggestion of G. Marchuk on the increase of allocations, particularly for the program of a space of peace. It seems to me that we had a hypertrophied space of war. If today we transferred a portion of the assets from this area for spending on the same extra-atmospheric astronomy, this would also be conversion. Here I would like to direct attention to the fact that the reduction of defense spending should take place first of all by the reduction of series production: it is necessary to produce fewer tanks and aircraft, but by no means through the sharp reduction of scientific research, including of the defense type. I believe that it is simply necessary to find new peaceful applications for it. For example, in aviation this is the development of more advanced civilian aircraft. The Experimental Design Bureau imeni P. Sukhoy, which M. Simonov heads, jointly with an American firm is now making a supersonic aircraft for businessmen. Moreover, there are high-speed transport and power engineering, ecology is very closely associated with them. It is worth dealing with all this.

Another of the means of saving our science is joint projects. I have spoken about one of them. But it is a great pity when our specialists depart for the West to work for a considerable period. This is actually a brain drain. I believe that it is also worthwhile for the Academy of Sciences, however paradoxical this is, to try to get orders from foreign firms, so that we would conduct scientific development for them.

K. Frolov, USSR people's deputy:

Today the fates of science and perestroyka have become intertwined. Only the progress of the former can ensure the intensified development of the latter. Precisely for this reason society should protect basic research.

I believe that it would be proper if the Committee for Science of the Supreme Soviet would also see to the return of the 100 technical and technological institutes from industry to the bosom of the Academy of Sciences.

Physicists Form Independent Society

907A0054B Moscow IZVESTIYA in Russian 14 Nov 89 Morning edition p 2

[Article by Doctor of Physical Mathematical Sciences Professor Sergey Kapitsa under the rubric "Fact and Commentary": "The Physics Society Is Being Established"; first paragraph is IZVESTIYA introduction]

[Text] A new society of physics scholars, engineers, and instructors of the higher school is being established. Its constituent congress will be held soon. Doctor of Physical Mathematical Sciences Professor Sergey Kapitsa comments on the future program of the USSR Physics Society:

The main task of the society is the utmost development of our science, the strengthening of its influence on industry, and the improvement of the teaching of physics at all level. Vital importance is being attached to the level of basic research, in which the state of physics predetermines the development of many sections of science.

There is a set of questions, which require the elaboration of an independent and qualified opinion on major projects in the area of the economy, ecology, and defense. Precisely a public organization of scientists can submit a detailed evaluation and provide an unbiased appraisal and can oppose the dictatorship of departments or individual influential groups. The necessity of such appraisals is also important for science itself.

The Physics Society, which unites scientists and engineers, who are physicists, and instructors regardless of their departmental affiliation, can become not only an effective means of professional contact, but also a method of establishing ties, which we so lack today. In this respect I should indicate the necessity of the utmost development of the information supply of our science and the establishment of data banks, information networks, and efficient channels of the exchange of information and publications, first of all BYULLETEN FIZICHESKOGO OBSHCHESTVA.

Today the questions, which are connected with the promotion of physics and the defense and consolidation of the social positions of science, are also vital. The emancipation of our society, as well as the spiritual crisis, which we are experiencing, have led to the increased activity of antiscientific and anti-intellectual forces and to the decrease of the role of science and of physics, in particular, in social consciousness.

The group of questions, which are connected both with the attraction of school youth to our science and with the organization of the teaching of physics from the school to the university and higher technical educational institution and the formulation of a general, if not a unified approach to this matter, is broad.

Finally, there are a number of questions, which are connected with the protection of the social and professional interests of physicists, including the provision of assistance and the granting of guarantees and their protection in case of inventive and entrepreneurial activity. The necessity of establishing a separate fund of the Physics Society is also obvious.

In essence, it is a question not so much of the formation of a new society as of the restoration of the Russian Physics Society, which was founded back in 1872 on the initiative of Mendeleyev, Yakobi, Lents, and others.

UkSSR Academy of Sciences Reviews Personnel Issue

907A0018A Kiev VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR in Ukrainian No 8 Aug 89 p 11

[Report under the "In USSR Academy of Sciences Presidium" rubric: "Training of Highly Skilled Specialists"]

[Text] AN USSR [the UkSSR Academy of Sciences] Presidium reviewed the results of fulfillment of the 1988 plan of training Doctors of Sciences and discussed the plan for training Doctors of Sciences in priority directions for 1989.

In his report AN USSR Vice President, AN USSR Academician V. P. Kukhar noted that in 1988 AN USSR scientific associates (average age 46.8 years) had defended 151 Doctor of Sciences dissertations. He called attention to the role AN USSR scientific institutions and Department Bureaus play in the training of highly skilled specialists.

In the last five years, AN USSR scientific associates defended 603 Doctor of Sciences dissertations, 66.5

of those in priority fields. However, during this period not one dissertation had been defended in such important fields as CAD systems (in specific industries), environmental protection and efficient utilization of natural resources. The average age of Doctors of Sciences at the Geological Sciences Institute, Geology and Geochemistry of Combustible Materials Institute, Casting Problems Institute, Technical Thermal Physics Institute, Gas Institute, Social and Economic Problems of Foreign Countries Institute, Archeology Institute, Linguistics Institute imeni O.O. Potebnya and AN USSR Central Republican Botanic Garden is high. Therefore, one must take measures aimed at "rejuvenating" the cadre of highly skilled specialists.

Director of the Colloidal Chemistry and Hydrochemistry Institute imeni A.V. Dumanskiy, Doctor of Chemical Sciences A. V. Goncharuk, Academician Secretary of the AN USSR Physical and Technical Problems of Power Engineering Department, AN USSR Academician A. K. Shidlovski, and Academician Secretary of the AN USSR Physics and Astronomy Department, AN USSR Academician V. G. Baryakhtar took part in the discussion.

In his closing speech, President of the USSR Academy of Sciences Academician B. Ye. Paton noted that problems of training of highly skilled specialists are being discussed on a regular basis. The deteriorating situation with the average age of Doctors of Sciences is due to the predominance of traditional fields, in which scientists have been working for many years without making any significant progress.

He called attention to insufficient use of dissertation defense in a scientific report form and to inadequate help given scientists working in priority directions.

The adopted resolution instructs AN USSR Department Bureaus and scientific institutions to reconsider the list of professions that determine main directions of S&T progress.

The Personnel Administration of the AN USSR Presidium has been instructed to summarize AN USSR Departments' proposals and submit the list for approval by the Presidium.

New Organization to Improve Information Flow

907A0054A Leningrad LENINGRADSKAYA PRAVDA in Russian 10 Oct 89 p 3

[Interview with Candidate of Physical Mathematical Sciences Mikhail Isichenko, chairman of the All-Union Society "Young Scientists of the World," by LENINGRADSKAYA PRAVDA correspondent V. Tveritina, under the rubric "A Topical Interview": "Young Science Expands Boundaries"; date and place not given; first paragraph is LENINGRADSKAYA PRAVDA introduction]

[Text] The constituent conference of a new public organization, which following the example of Academician Ye.P. Velikhov received the name "Young Scientists of the World," was held during the last days of September in Moscow on the basis of the Institute of Atomic Energy imeni I.V. Kurchatov. Representatives of the most prominent scientific centers of the country, including Leningrad, attended it. The first question, which our correspondent asked Candidate of Physical Mathematical Sciences Mikhail Isichenko, chairman of the society, who was elected at the conference:

LENINGRADSKAYA PRAVDA: To what extent do the goals and tasks of the new organization correspond to such a high-sounding name?

Isichenko: One of the conditions of the creative activity of scientists is the free exchange of information and ideas. Moreover, not only in the passive form of scientific publications, but also in active human contact and joint scientific work. Unfortunately, it is much more difficult for young scientists to establish such contacts than for our colleagues of the older generation. Therefore, our society will assume the role of an intermediary, which will help young people in the acquisition of experience of international cooperation during the initial period of their scientific career, at the age of what is called "flexible reaction."

LENINGRADSKAYA PRAVDA: But for what is another structure needed, if there already exists, for example, the system of councils of young scientists and specialists?

Isichenko: The point is that this system was initiated many years ago by Komsomol and bears the same traits of a bureaucratized organization. And like Komsomol, the councils of young scientists are attempting (most often in words) to solve the entire set of inexhaustible problems of young people. The All-Union Society "Young Scientists of the World" should, in our opinion, focus on one of the most important problems—the broadening of scientific contacts in forms that are new for us. One of them consists in the creation of the conditions for the temporary job placement of young Soviet scientists at foreign scientific centers on a contractual basis. This is a form of scientific exchanges, which is universally recognized in world practice.

LENINGRADSKAYA PRAVDA: But in our country they often call it "the selling of brains," putting into this concept a negative meaning. It is implied that such a form does harm to the intellectual potential of the "exporting country."

Isichenko: In my opinion, such a point of view is groundless. The export of irreplaceable raw material resources, in contrast to which "brains" are being wonderfully reproduced by our preserved system of scientific schools, is strategically more dangerous.

Such exchanges do not require any initial investments of convertible currency whatsoever, inasmuch as the published and used scientific result in this case is paid for by the foreign employer.

LENINGRADSKAYA PRAVDA: But what is to be done with the administration of institutes locally? It is no secret that when selecting candidates for foreign business trips they look most often at the academic degree and public work, and not at all at the results of the research of a scientist. This problem, as far as I understood from conversations with conference participants, worries many people.

Isichenko: Indeed, local authorities are at times stronger than the laws that are passed in the center. During the discussion of the idea of establishing the society I asked Academician Ye.P. Velikhov, director of our Institute of Atomic Energy, the question: "Are you willing to discharge a young scientist for the time of his practical studies in another country with the guarantee of subsequent reinstatement at the institute?" He said: "At once, if you like. This is a saving of the wage, this is the training of brains, this is a new level of skill of the scientist. This is advantageous for us."

Executives will probably not everywhere treat this idea with such understanding. But I believe that with the development of the democratization of science this problem will also be solved.

LENINGRADSKAYA PRAVDA: Any public organization, especially such a one as yours, needs at the first stage certain material assistance and support. In other words, how do you intend to get on your feet?

Isichanko: Of course, at first we will require support. Therefore, we decided to register the society "Young Scientists of the World" as part of the USSR Union of Scientific and Engineering Societies, where they treated our ideas and plans with understanding.

The membership dues of the individual and collective members of the society should become the financial basis. We are also hoping for the support of foreign public foundations.

LENINGRADSKAYA PRAVDA: And who can join the society?

Isichenko: Scientific personnel, graduate students, instructors of higher educational institutions not over the age of 35, upperclassmen, who have scientific works, inventions, or scientific publications. Moreover, citizens of other countries may also become individual members. We can also admit entire collectives of sectorial and academic institutes, higher educational institutions, centers of scientific and technical creativity of youth, scientific cooperatives—in short, all the organizations, at which new promising directions of science are being developed and which are interested in the development of their young scientists.

From the editorial board: it is possible to obtain more detailed information by calling 278-19-60.

Formation of Seismological Service Recommended

907A0046A Moscow ARGUMENTY I FAKTY in Russian No 44, 4-10 Nov 89 p 3

[Article by V. Morgunov, lead scientific associate of the Institute of Earth Physics of the USSR Academy of Sciences: "It Is Not Necessary to 'Import' a Method"]

[Text] The assertion of French geologist and volcanologist H. Tazieff concerning the existence of a single correct method, which was developed in Greece and makes it possible, as was asserted in the article, to predict up to 80 percent of the destructive earthquakes (ARGUMENTY I FAKTY, No 25, 1989), seemed debatable to me. In my opinion, our misfortune lies not in the lack of domestic methods of scientific forecasting, but in the lack of means and in the organizational quagmire, when it comes to the use of these methods in practice.

The retrospective analysis of the data on the Spitak earthquake showed that the approach of the catastrophe was recorded by instruments in advance. Nature sent signals, but we were not prepared to make use of them.

The reason is our lack of a special seismological forecasting service. In contrast to scientific research, a higher level of technical equipment, the establishment of a network of stations, stable communications at large distances, and the introduction of reliable computers are required for such a service.

Another area, in which difficulties can arise, is the social legal aspects. Economic losses are inevitable in case of the giving of alarms. Some of the losses may prove to be unjustified: for example, in case of false alarms. The solution of this problem is seen in a differentiated approach to warning signals: forecasts even with not too high a degree of likelihood should be taken into accounting when notifying schools, hospitals, and housing tracts. In case of the organization of the service it is necessary to avoid extremes, without paralyzing the initiative of scientists with "severe liability" for a mistaken forecast: as we know, mistakes are inevitable, after all, even when forecasting the weather.

H. Tazieff is absolutely correct in placing the establishment of a seismological forecasting service in the category of urgent measures. The harm from the possible destruction of a number of industrial objects (hydroelectric power plants, nuclear power plants, chemical works) can exceed by many fold the outlays on the organization of such a service. Thus, the establishment of such a service would be not only a humane, but also an economically justified act.

Poor Information Exchange Impedes S&T Progress

907A0055A Moscow SOVETSKAYA ROSSIYA in Russian 16 Nov 89 1st edition p 1

[Interview with Nikolay Nikolayevich Grishchenko, director of the Kuybyshev Scientific and Technical Information Center, by SOVETSKAYA ROSSIYA correspondent S. Shkayev, under the rubric "Our Dialog" (Kuybyshev): "They Purchased What Belongs to Other People, They Ruined Their Own. N. Grishchenko, Director of the Kuybyshev Scientific and Technical Information Center"; date not given; first two paragraphs are SOVETSKAYA ROSSIYA introduction]

[Text] It has long been known that experience is the most profitable capital. But a strange situation has formed in our economy. While often having the most advanced ideas and developments, for years or else for decades we do not find an application for them. While having such developments, which are quite capable of providing the country with prestige and products with competitive ability on the world market, we are methodically purchasing similar items and technologies abroad. Here we complain of a shortage of information on innovations, although we ourselves are creating this shortage, so to speak, with our own hands.

Why is it happening like that? With this question our correspondent began the interview with Nikolay Nikolayevich Grishchenko, director of the Kuybyshev Scientific and Technical Information Center (TsNTI).

Grishchenko: It is possible to cite as many examples as you wish of information "myopia" and helplessness from the practical experience of our Kuybyshev Oblast. For example, the Strommashina Plant, the All-Union Institute for the Planning and Organization of Power Construction, the Syzran Neftemashremont Plant, and many other enterprises, which introduce, according to the data of the All-Union Society of Inventors and Efficiency Experts, more than 1,000 inventions and over 80,000 efficiency proposals a year, in spite of this, are in distress from the shortage of innovations. The figure is as if satisfactory, but there is no joy. Because innovations "are becoming smaller," turning more and more into amateur means of improving "nails" and into immediate "minor rationalizations." That is why 3 years ago only 5,600 information cards for introduced innovations arrived at our center. And a year later 5,000. This constitutes a little more than 6 percent of the total number of introductions. This is what it comes to, when innovations are hidden behind plant fences and are duplicated only for internal consumption.

SOVETSKAYA ROSSIYA: Does it turn out that both the quantitative and qualitative aspects of the intersectorial exchange of offered information so far have been deteriorating?

Grishchenko: Yes, honestly speaking, things are poor. The analysis of the paper flow shows that only 35-40 percent of the enterprises are participating in the active exchange of information. The developments, which are turned over to the scientific and technical information center for storage, according to regulations should be accompanied by high-quality documentation for the facilitation of their introduction in production. However, only a fourth of the innovations come with documentation. And this is also a recurrent paradox of the low rate of introduction of advanced solutions, inasmuch as the consumer has to be sent hundreds and thousands of kilometers for the documentation. Such red tape and losses of assets do not satisfy the constantly growing demand of specialists.

Moreover, the legalized reductions of staffs at enterprises have sharply reduced the expenditures on scientific and technical service and first of all at the expense of information subdivisions. Throughout the world information is regarded as a strategic national resources, while in our country you only hear that cost accounting and self-financing are making it incumbent to cut back on spending. But excuse me! What cost accounting can rely on the sledge hammer, crowbar, and technology of days of old? This is also nearsighted practically, for tomorrow the information immaturity of our society can turn and is already turning into dependence and the desire to buy everything for currency in the West.

SOVETSKAYA ROSSIYA: But is this not happening because scientific and technical progress in our country is being developed only in an evolutionary manner, by infinite minor improvements of what is old? We squeeze out a return in drops. The latest computers and lasers and plasma and electrochemical technologies remain beyond the doorstep of enterprises. But meanwhile 100,000 people in the city are engaged in difficult physical labor. Of them more than 40,000 are women. Throughout the country the number of women, who are poor madonnas with sledge hammers, comes to the millions. And even if we do introduce innovations, we take not the best and more wasteful methods than the ones which are being used in the world. For example, we spend on a product, which is analogous to a western product, 1.75-fold more metal, twofold more cement....

Grishchenko: And these facts anger me, because in case of the proper sectorial exchange of scientific and technical information we are completely capable of avoiding such misunderstandings and of eliminating the imbalance between workplaces and the need for manpower resources. Scientists of our planning institute, for example, calculated that in industry the shortfall of workers is 18 percent. Just in the nonproduction sphere of the oblast the need is at the level of 30,000. And in addition to that the losses of working time are enormous, overtime is flourishing. Under these conditions the directors of plants and their engineering services, it would seem, should snatch up any innovations, which are capable of increasing labor productivity and of raising the standards of production. However, you will not drag many to us, to the scientific and technical information center, on a lasso. But there are examples, when our innovations increased labor productivity by 2.5-fold at the Metallurgical Plant imeni V.I. Lenin, the Association imeni M.V. Frunze, the Plant of Motor

Vehicle and Tractor Electrical Equipment, the Kuybyshevneftekhimstroy Association, and so on.

SOVETSKAYA ROSSIYA: Why did these cases not become the rule and rather serve as an exception to the rules? Did the economic mechanism even after the amendments to the Law on the State Enterprise really not change the state of things?

Grishchenko: No, the situation is changing. But slowly, because the economic mechanism still remains unfinished and it is easier to obtain an impact not by means of advanced technical solutions and borrowings from information sources, but by means of the exclusive right to increase the prices for a product, without improving anything.

SOVETSKAYA ROSSIYA: But this is a wasteful trick which leads to inflation. For enterprises are providing neither more products nor better products.

Grishchenko: You are correct. But that is why it is necessary to aim the mechanism of management in the direction of the information and scientific capacity. It is possible to obtain a more significant impact. And there are many examples of that. Thus, just the introduction of the corrosion protection of construction components at the Kuybyshevfosfor Association saved 131,000 rubles. The borrowing again of one original device for drilling enabled the aircraft plant to save 137,500 rubles. The Volgotranszhelezobeton Trust jointly with the special design bureau of the Main Administration for the Production of Construction Parts and Components introduced a new system of precision batching in case of the production of concrete and saved 230,000 rubles. In the agroindustrial complex of the oblast 72 borrowed innovations brought the state 1.3 million rubles. Is this not the best advertisement of the effectiveness of timely scientific and technical information?! But why then, you will ask, do all economic managers not see this? Because, figuratively speaking, they get lost in the documents and bulletins, which are sent out to us, and at times also do not trust them. But for there to be trust, the automation of information service first of all is necessary. Already today we are beginning the servicing of clients according to the system of the selective distribution of information with the use of computers. In all 830 subscribers, Kuybyshev plants, higher educational institutions, and scientific research institutes are using our channels. But this is not enough, especially if you consider that for the present we are limited in special service, for example, in the making of patent information available. True, the present Vektor-II automated system makes it possible to perform such service in accordance with the databases of the International Center of Patent Documentation. But subscribers are not in abundance—there are 48 higher educational institutions, scientific research institutes, design bureaus, and other organizations.

SOVETSKAYA ROSSIYA: It turns out that for ordinary enterprises, which provide the lion's share of the output in the oblast, valuable information is still under lock and key. But why is your center such an inactive seller? For by means of computer you could transmit information over telephone channels. What, it would seem, is easier, you pay money and collect on the display screen information about needed innovations.

Grishchenko: It is a tempting picture, especially as such computer hardware is already appearing. And we would be glad to sell innovations, only our organization for the present is noncommercial. It so turned out historically that they established a network of oblast and sectorial information centers. But when they established it poorly, it turned out that reduced opportunities were afforded us. Why? All for the reason that, as the owner of information, until recently we did not receive a profit for it and, accordingly, could not dispose of it at our own discretion.

SOVETSKAYA ROSSIYA: Do you mean to say that today, too, information does not have a firm price?

Grishchenko: Yes. And that is why due to its inestimable value it is becoming "nobody's" property with all the ensuing consequences. Just imagine: our collection of scientific and technical documents numbers more than 7 million units. Here there are descriptions of inventions of the USSR, the CEMA member countries, and the leading capitalist powers. This is a unique and the only collection in the Middle Volga Region! But meanwhile it is simply going to ruin: annually up to 150,000 documents become useless here. Because there are not enough state assets for the maintenance of this collection. It becomes painful when you go down into the damp unadapted basements which have been set aside in the House of Industry. Pipe breaks constantly occur here, the shelves are eaten by fungus. This noncost accounting decay is also eating away our efforts, which are supported entirely by enthusiasm. Specialists and scientists at times wait weeks for copies of documents and are exasperated. But what is to be done?

SOVETSKAYA ROSSIYA: You yourself proposed to base cost accounting on the sale of information. And with these assets to support the formation of an electronic service. Then you will, perhaps, also get your collection out of the basements and put it entirely on computer.

Grishchenko: All that is so. But first it is necessary to know the price for information. And this is not an oblast, but a union problem, which it is possible to solve only by the passage of a law on invention. But for the present, apparently, it is necessary to improve our material and technical base, on the basis of adopted decisions. Since 1975 in the oblast they have not been able to specify their position on the construction of the production and laboratory building of the scientific and technical information center. There are no obvious opponents, but all the promises of the leadership of the oblast are sinking in the sand. A ridiculous situation is resulting: the USSR State Committee for Science and Technology is seeing to the allocation of capital investments and limits of contractual work. And 2.5 million rubles have already been allocated. But local organs are hushing up the decision in every possible way. But since our center is the largest one in the region, it would probably be possible to erect it on a sharing basis with other enterprises. Or to give up the additional deductions from the profit. And they would then not scatter

scarce capital investments. The scientific and technical community of the Volga River Region is "for." There is also another possibility: if we acquire full financial independence, with our own earned money we could ourselves seek a contractor. In short, it is necessary to seek means so that information resources would work more efficiently for the benefit of perestroyka.

Expenditures on Computer Equipment Imports Criticized

907A0050A Moscow NTR: PROBLEMY I RESHENIYA in Russian No 20, 20 Oct 89 p 5

[Article by Academician of the Belorussian SSR Academy of Sciences V. Labunov, scientific supervisor of the Belorussian Republic Informatika Intersectorial Scientific and Technical Program and USSR people's deputy: "The Status of Most Favored Treatment"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] Research and development, which are aimed at the informatization of Soviet society, should receive the status of most favored treatment, asserts Academician of the Belorussian SSR Academy of Sciences V. Labunov, scientific supervisor of the Belorussian Republic Informatika Intersectorial Scientific and Technical Program and USSR people's deputy.

Today it is already well known to everyone that our lag behind the developed countries in electronics, computer technology, and the number of computers of various classes amounts to tens and hundreds of fold.

Why is it happening this way? Let us recall that just recently at the 1st Congress of People's Deputies machine building, and only machine building, was called the priority direction of the development of scientific and technical progress. Meanwhile in all the developed countries of the West information science long ago had already become a priority direction.

What specialist does not know about the American "strategic computer initiative," about the extravagant Japanese program of the development of fifth-generation computers, and about the all-European ESPRIT Program, by means of which the countries of our continent—not we!—intend to compete with the United States and Japan? But of course—practically every civilized state has today a priority, I stress, priority, program of informatization.

We, I repeated once again, half a year ago called machine building priority. Today the situation is even more complicated. On the one hand, perestroyka is under way and the people are placing enormous hopes on it. On the other, our economy is not on the rise, but on the decline. An enormous number of immediate, though very important, problems are arising, people are demanding foodstuffs and consumer goods "to be placed on the table."

It is not surprising that the strategic questions of the development of the country at such a moment are forgotten and at best are set aside. Strikes, national problems, the constant universal shortage—now at the session of the Supreme Soviet no one is mentioning even machine building, it is a question only of the so-called base sectors of the national economy, first of all these are transportation, power engineering, resources....

I am convinced that the task before specialists in information science today is as follows. It is necessary to get to everyone, from rank and file workers to representatives of the highest echelons of power, the simple idea that the informatization of society is first of all the sharp increase of labor productivity, moreover, in all areas. If in the country there is not a highly developed information science industry, we will not make progress in a single sector.

However, although today inquiries and mandates are coming to the Supreme Soviet, if seems, from anyone you like, among them there are no materials from specialists in information science. Instead of crying out against our tragedy in this area, they are...keeping silent!

But the moment is now special. The budget for 1990 is being considered. And it must be said honestly: the representatives of each sector as much as they are able "are pulling the blanket" onto themselves. Machine builders for themselves, coal miners for themselves, metallurgists for themselves.... While they divided us, the few people who know about information science, into several commissions and committees, and in no way can we if only gather together to protect the money which was initially allocated for informatization.

A special question is the importing of computer hardware. Now cooperatives, intermediary joint ventures, and simply individuals are purchasing aboard and bringing into the country a clearly unknown, but very significant number of personal computers. Subsequently organizations, as a rule, buy them up, but at very excessive prices. Such an amount of money is being spent on this that, if we were able to organize this process and buy them up for the same money in a centralized manner and, what is more, at wholesale prices, we could obtain main fold more "PC's." Moreover, this would greatly simplify the problems of their use, software, and repair.

But for the present.... I attempted to ascertain if only how many imported computers had been brought in such ways into the USSR. No one knows.

I had occasion to talk with specialists, who believe that it is necessary to spend immediately all our limited foreign currency resources on the purchase of imported personal computers. In their opinion, this will make it possible to satiate the computer shortage and will serve as a good springboard for the further development of informatization. I do not agree with this, although I also do not rule out such a means. I am convinced that it is necessary to invest foreign currency in the establishment of joint ventures for the production of computer hardware. Precisely through them we will be able to produce the necessary number of computers and, if their products prove to be competitive, also to sell them on the international market.

But such ventures can hardly emerge in any region of the country, a specific infrastructure, first of all experienced skilled personnel, is needed for them. Meanwhile, in the

program of the informatization of Soviet society, which is now being formulated, the regional aspect is obviously being underestimated.

I believe that we cannot today develop information science uniformly throughout the country. The approach should be as follows: to identify the regions, which actually from the point of view of the scientific and production structure, which exists there, can invest quite significant assets in information science. Belorussia, where the assimilation of the YeS 1842 personal computer is now nearing completion at the Vychislitelnaya tekhnika Scientific Production Association and many other organizations of the information type operate, is, undoubtedly, one such region. Here within the framework of the republic Informatization Program we attempted to unite all the scientific and production forces in a single complex, having eliminated as far as possible the intersectorial barriers that are hindering the development of this most important direction.

Moscow, Leningrad, the Ukraine, and Novosibirsk may become other regions—I cannot name all of them, this question requires special study. It is there that it is necessary to channel the relatively few assets that will be allocated in the country for information science, here it should begin and acquire strength. And then.... These regions will expand and unite and in the end will form an all-union structure.

But if out of fixed habit we again give "all the sisters an earring each," then, as in agriculture, we will invest heaps of money and will receive nothing in the end result. I believe that this must not be allowed.

Personal Computer Symposium Emphasizes Domestic Production

907A0050B Moscow NTR: PROBLEMY I RESHENIYA in Russian No 20, 20 Oct 89 p 2

[Article by F. Vladov: " 'Their' Processors in Our 'PC's'"; first paragraph is NTR: PROBLEMY I RESHENIYA introduction]

[Text] From 10 to 16 October in Minsk the Belorussian Scientific Production Association of Computer Technology, the Ekspotsentr All-Union Association, the All-Union Komsomol Central Committee, and the Minsk City Center of Scientific and Technical Creativity of Youth imeni P.M. Masherov held the first international symposium "Information Science-89," which was devoted to the development and use of personal computers. A plenum of the All-Union Society of Information Science and Computer Technology, as well as a meeting of the founders of the International Computer Club (incidentally, the latter jointly with the Soviet-American Dialog Joint Venture and the Radiotekhnika TsKSO acted as the sponsor of the past symposium) took place within the framework of the symposium. And, finally, the international exhibition "Personal Computers-89," in the work of which about 90 firms from 16 countries participated, became a kind of highlight of the program.

Is 1.5 years a lot or a little? In May of last year, here, in Minsk, the All-Union School-Seminar "The Development and Introduction in the National Economy of Personal Computers" took place, and I attempted to make it a kind of reference point. What at that time interested first of all nearly each of the 1,000 participants? How to get a "PC," how to obtain the needed programs. What was there at the exhibition? There were 15 poorly compatible models of domestic personal computers with peripherals, which today it is simply shameful to recall.

And what about now? The computer shortage is gradually losing its acuteness, in many respects owing to state, cooperative, "joint" (intermediary joint ventures), and individual imports. Nearly every self-respecting enterprise, even if at times for a fantastic—as compared with the normal cost—sum, has acquired some number of personal computers.

So that the primary shortage of professionals, the people who urgently need computer hardware, to a significant degree has been alleviated—if only the sharp decrease of the prices for professional personal computers, which are supplied by cooperatives or joint ventures and are even simply sold in stores selling second-hand goods on commission, testifies to this. But this, of course, is only the first stage, the very beginning of the process of the informatization of society. As the experience of developed countries shows, "PC's" can and should be of benefit everywhere: in stores and hotels, drugstores and patrol cars, local soviets and libraries (I am not talking about the sphere of physical production). But so that they would appear in all similar places, they should number not in the tens and even the hundreds of thousands, but in the millions.

Here no imports will help any more—it is necessary to develop a new and sufficiently powerful sector of industry, which is capable of producing personal computers in such numbers. As First Deputy Chairman of the USSR State Committee for Computer Technology and Information Science I.N. Bukreyev said, the necessary capacities are now being created. According to the estimate of experts of the state committee, the total need of the country for personal computers by the year 2000 will range from 17 million to 28 million, and it is proposed to achieve this level as follows: 1.1 million during this five-year plan, about 8 million during the next one, and, finally, approximately 2.5 million a year during the 14th Five-Year Plan. Moreover, these will no longer be mixed models—all of them will come off the line at the very beginning of the 1990's—but computers of a unified series, which are fully compatible both with each other and with the standards that have now been adopted in the world (they, as is known, are set by IBM).

The shortage or else the complete lack of high-quality microprocessors, which are similar to the Intel 180286 and Intel 180386, which are well known worldwide, is perhaps the most vulnerable spot of this program. Precisely their shortage is hindering the mass production of the YeS-1841 personal computer and especially the YeS-1842 personal computer—the first Soviet machine that conforms to world standards.

Those who gathered received with all the more satisfaction the words of I.N. Bukreyev that plants, at last, had been permitted to purchase imported processors and to produce computer hardware based on foreign components. It is gratifying that we are no longer feigning "national pride," have ceased, as S. Ushakov, my colleague from LITERATURNAYA GAZETA, expressed himself on this account, "to puff out our cheeks," and are switching to the path of international cooperation in the development of "PC's," which the entire world has been taking for a long time now.

However, in spite of definite progress, much anxiety about the situation, which has taken shape today in the area of informatization, was clearly sensed at the symposium. This anxiety was heard in most concentrated form in the statement of Academician of the Belorussian SSR Academy of Sciences and USSR People's Deputy V.A. Labunov (we are publishing, with the kind permission of the author, the text of this statement on page 4 of this issue of NTR). Moreover, the discussion of several hundred papers and reports enabled the symposium participants to outline a number of measures which are necessary for the fundamental improvement of the situation. All their suggestions were included in the text of the appeal which was sent by the symposium participants to the USSR Supreme Soviet.

New Turkmen Academy President Describes Program

907A0048A Ashkhabad TURKMENSKAYA ISKRA in Russian 10 Oct 89 p 2

[Interview with President of the Turkmen SSR Academy of Sciences Agadzhan Geldyyevich Babayev, corresponding member of the USSR Academy of Sciences and director of the Institute of Deserts of the Turkmen SSR Academy of Sciences, by TURKMENSKAYA ISKRA correspondent N. Chapayeva, under the rubric "Our Interviews": "Priorities and Parities"; date and place not given; first two paragraphs are TURKMENSKAYA ISKRA introduction]

[Text] As is known, as a result of the election, which was held for the first time on an alternative basis, Corresponding Member of the USSR Academy of Sciences A.G. Babayev, director of the Institute of Deserts of the Turkmen SSR Academy of Sciences, became president of the Turkmen SSR Academy of Sciences.

We asked Agadzhan Geldyyevich to acquaint our readers briefly with his program of the further development of academic science in the republic.

[Answer] It is difficult to overestimate the importance of science today. Precisely it is being made the basis of all the plans and dreams of the Soviet people, who have embarked on the path of perestroyka. And that is why we are not permitted to be idle. It is necessary to increase sharply the practical return of scientific research.

Turkmen science, in my opinion, is capable of attaining higher levels, having extended its specific character. That is, in the priority directions to proceed unswervingly from the peculiarities of nature and the way of life under the conditions of the desert, while increasing in so doing the comprehensiveness of their study.

I would particularly like to stress that in the "science-practice" chain there are no secondary links. The Academy of Sciences should conduct basic research which is intended for the future, but in it there are always elements of applied importance. It is here that sectorial science is obliged to show its worth as a rapid response force and to bring the scientific result up to a technological level, while production is obliged to display the readiness to accept an innovation and to use it not less promptly. In connection with this I see as an immediate goal of the Academy of Sciences the establishment of a close partnership with sectorial institutes. At present this important connecting link has been weakened.

There are also, of course, problems with production. For example, our scientists are doing much to aim agricultural production in the direction of intensive development. However, as soon as it comes to the introduction of developments, we encounter resistance. Incidentally, it is due far from always to the subjective nonreceptivity of managers to science, but rather to objective economic causes. Obviously, the conditions of most favored treatment are needed. For example, to see to it that for 1-2 or else 3 years the introduction of scientific achievements would not be a heavy burden on the production cost of agricultural products. To think about other economic levers as well.

Under present conditions the question of the self-financing and cost recovery of science, including academic science, is not being eliminated and will not be eliminated. In some fields it is possible to achieve this. Real means of stimulating economic contractual activity exist. But the greatest reserves lie in something else. Life is such that we will have to learn to trade in the results of scientific labor. I am convinced that our theoretical developments will find a demand on both the domestic and the foreign market.

The Academy of Sciences also has to express its formidable opinion in the solution of social and ecological problems, which are highly disturbing people. In particular, the Institute of Deserts is now engaged in earnest in the breaking of the territory of the republic down into regions for the purpose of establishing scientifically substantiated wage coefficients.

I will dwell in a little greater detail on the ecological question. Our republic is located entirely in the zone of deserts. But we have grown accustomed to approach deserts almost exclusively from a geographic point of view, missing in so doing their large economic potential. Only through comprehensive study will we be able to ensure the normal functioning of ecosystems and to use efficiently the natural resources of our austere and most wealthy region. I am not afraid to repeat myself, we should also take these goals as a guide in the determination of the priority directions both in academic science and in sectorial and VUZ science. They will help our academy to acquire its own character. Which it is extremely necessary to do. As much as we would like to, we will not be able to emulate the academies of the fraternal republics and especially to duplicate the USSR Academy of Sciences.

However, let us return to ecology. During the years of stagnation most serious disturbances were allowed in the "man-desert" system. Therefore, our scientists must find ways of restoring the dynamic equilibrium of the natural environment and identify the possibilities of the efficient use of the new natural resources of deserts. But given all this there should be no haste. Any irrational step in the use of such a fragile ecosystem as the desert can lead to negative phenomena and, at times, to irreversible consequences.

As a result of the comprehensive study of deserts the directive organs of the republic will have precise forecasts and recommendations for the efficient management of the national economy, natural conservation work, as well as the solution of social problems. An adequate scientific potential of the natural and social sciences exists at our academy for correct forecasting, we will also try to strengthen the material and technical base.

Elections in AzSSR Academy Eliminate Geophysics Candidates

907A0045A Baku BAKINSKIY RABOCHIY in Russian 21 Oct 89 p 2

[Article by Doctor of Geological Mineralogical Sciences Professor V. Kulikov, USSR State Prize winner and senior scientific associate of the Southern Department of the All-Union Scientific Research Institute of Geophysical Methods of Prospecting, and Candidate of Geological Mineralogical Sciences L. Andreyev, head of a laboratory of the Southern Department of the All-Union Scientific Research Institute of Geophysical Methods of Prospecting, under the rubric "The Opinion of Scientists": "The Academy Without Geophysicists. An Afterword to the Election"]

[Text] The election to the Azerbaijan SSR Academy of Sciences was recently held. The period of preparation for it revealed the considerable occupational growth of scientists of the republic, including geophysicists. As is known, Azerbaijan played a significant role in the formation and development of geophysical science. The first scientific organizations for geophysics in the USSR were established precisely here. Such well-known geophysicists as G.A. Gamburtsev, V.V. Fedynskiy, Ye.V. Karus, Yu.V. Riznichenko, Ye.F. Savarenskiy, and others, who subsequently become full members and corresponding members of the USSR Academy of Sciences, worked here.

The fact that four doctors of sciences, who are recognized in the country, from the YuzhVNIIgeofizika [the Southern Department of the All-Union Scientific Research Institute of Geophysical Methods of Prospecting] (an affiliate of the All-Union Scientific Research Institute of Geophysical Methods of Prospecting of the USSR Ministry of Geology, which was opened in Baku nearly a quarter century ago, but now a department of this institute) were simultaneously nominated to run for corresponding member for the one place in the specialty "geophysics," which was announced by the Azerbaijan SSR Academy of Sciences, also serves as evidence of the present high scientific potential of Azerbaijan geophysicists.

The candidates were supported by many scientific and production geophysical organizations of the country, academicians, and prominent geophysics scholars of the Soviet Union. However, none of the four, who could have worthily represented Azerbaijan geophysical science, was elected to the academy. We want to note here that among the members of the Earth Sciences Department, who voted and decided the fate of the candidates, there is not one geophysicist.

But meanwhile our YuzhVNIIgeofizika is working on important and crucial tasks, which follow from the fact that the reserve of all mineral deposits, which are accessible for identification by geological methods, in essence, is exhausted or is at this stage. Therefore, for the further growth of the mineral raw material base of the republic it is necessary to seek new objects in the depths of the earth. The study of the regional structure of the earth's crust, the identification of new objects for the search for petroleum and gas reservoirs, including at large depths and in traps of the nonstructural type, the forecasting of the focal zones of earthquakes, and the search for their harbingers are exceptionally important not only for Azerbaijan, but also for all the depression zones of the southern part of the USSR, beginning with the Black Sea and ending with the Pamir Mountains.

At the YuzhVNIIgeofizika research, which is of both an applied and a basic nature, was begun, a number of most important results, which were included in the list of achievements of scientists of Azerbaijan, were obtained. These are first of all a method of the forecasting of the physical state and the petroleum and gas content of deposits of great depths (7,000-10,000 meters), a local forecast of the section of the space near wells, the direct geophysical prospecting of petroleum and gas reservoirs, the forecasting of the focal zones of earthquakes, the formulation of a methodology of ore geophysics in mountainous areas, various maps and atlases of the petroleum and gas content of structures of the territory of Azerbaijan and the water area of the Caspian Sea, and much more. The institute developed into a prominent scientific geophysical center throughout the southern part of the USSR.

One must also not, apparently, forget that marine geophysics, which is playing an indispensable role in the study of the geological structure of seas and oceans and in the development of shelf zones for the recovery of petroleum and gas, originated in Azerbaijan. The first USSR State Prize in the field of geophysics was awarded to a collective of Baku specialists. The successes of this science in our republic in the 1940's and 1950's were so impressive that they dignified Azerbaijan by the name of homeland of geophysics.

Is it fair that our republic academy does not have in its membership representatives of this science?

We believe that for the objective selection of future candidates for membership in the Academy of Sciences it is necessary to use the system of surveying. Questionnaires should be sent to all scientific and production organizations of the country, as well as to well-known scientists in the corresponding directions of science. Only the generalized data of the obtained information can serve as objective criteria which make it possible to judge one candidate or another.

Moreover, in our opinion, the more differentiated breakdown of sciences by directions is necessary. For example, in our times the concepts "geology" and "geophysics" prove to be too collective, their sections developed long ago into independent sciences. In such a form it is difficult to evaluate the scientific potential of a candidate and his contribution to science.

We want to hope that the views expressed here will be taken into account and academic geophysical science of Azerbaijan will be represented by worthy scientists.

Ukrainian Physical-Technical Institute Copes With Self-Financing

907A0029A Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 24 Oct 89 p 2

[Article by correspondent S. Panasenko: "Staffs for an Idea"]

[Text] Can an academic institute work under cost-accounting without harming basic research? Most scientists would probably answer this question: No! In principle, they would be correct. Exploratory work, essentially done for no known reason, the need to collect a mass of data to reveal a single law, the need for powerful and costly equipment: what kind of self-support can it be a question of here? Nonetheless, the Ukrainian Academy of Sciences Physical-Technical Institute [FTI] has been using the first model of cost-accounting since this January. The associates are already talking about the second model. The institute director, V. Zelenskiy, UkSSR Academy of Sciences academician, sees nothing terrible in it:

"Such academic snobbery often hinders us all," he says. "Some scientists believe that their job is to think. It is not their concern by whom and how the obtained results will be used. A different view has taken root at our institute. We never consider applied projects second-class. This includes our leading theoreticians. That is why these projects are always done at a high standard and have, graphically speaking, a completely 'commodity form'...

All the same, will not the increased attention to applied work, especially with incentives, reduce interest in basic research?"

"There is no problem here," Viktor Fedotovich disagrees. "Firstly, a theoretical physicist nonetheless will not be remade into an experimenter or developer. He is simply otherwise inclined. Moreover, the whole system for organizing work at our institute serves as security for preserving 'fundamentalism.'"

Outwardly, the "new era" in the institute's life began quite bureaucratically: the scientific and technical department, which had played a very modest role until this, was converted into a kind of headquarters for the reforms that had been prepared. The development of management and material incentive systems and the organization of the circulation and introduction of the results obtained were placed on its "shoulders." V. Gusev, who headed the department, remembers that at that time, in the early 1980s, literally everyone had to be involved. The department associates studied the distribution of authority for the various management levels, the quality of planning, the efficiency of the work being done, and the potential of the engineering and technological base.

As a result, a program appeared, stipulating the creation of a comprehensive system for managing the institute. It outlines the formation of temporary (goal-oriented) laboratories and application groups and a quarterly assessment of labor efficiency and quality and of the suitability of associates to the position held. Organizationally, not only was experimentation not prohibited, but conversely, welcomed and encouraged. Work was allowed both in the "native" sector, nuclear power engineering, as well as on the side. The institute also invited participation in organizing an engineering center in the city. They even tried the cooperative form in those days, when there was not even talk of it.

"We especially encouraged the discovery of results that could be used outside the institute," V. Zelenskiy notes. "For this, the scientific council periodically 'tickled' a subject and studied the accumulated baggage of ideas in the departments...

"Application problems often arise because a potential customer requires something quite different from what the institute can offer," V. Gusev continues. "We must develop, rework and adapt. Production workers have neither the experience nor the opportunities for this. Scientists have the desire. We do not turn down refinement work. As a result, we have earned a good reputation..."

Affirmation of these words towers nearby. It is a production laboratory building built by a customer for some of the institute's developments. It appeared thanks to a small group of associates, who had worked to increase the density and stability of graphite for reactors. The subject was not considered very promising. Yet, suddenly—a result which nobody had anticipated!

At some other institute, it would have been brushed aside: one's head spins even without secondary ideas, they would say! Yet, the FTI acted otherwise. As soon as it was discovered that power engineers were not interested in the find, V. Zelenskiy began directly to "approach" the ministers of other sectors. It turned out that the new development was worth its weight in gold for them. Without hesitation, they allocated funds for the new building, where experimental work is done and the graphite needed by customers is produced.

Of course, restructuring at the institute has repeatedly come up against artificially erected barriers. Today V. Zelenskiy remembers the difficulty with which he received permission to create goal-directed laboratories: the idea "did not fit" within the stagnant scientific and technical frameworks and seemed suspicious. Right now, 60 goal-oriented laboratories and 11 goal-oriented departments operate at the institute, and the absolute majority of the associates work in them.

"Most work here starts when the scientific council announces: here is a certain problem, by whom and how is it to be solved?" says V. Zelenskiy. "We do not look at degrees and positions, provided that there is a grain of reason in the 'claim.' If the scientific council approves it, you receive a staff and money. And you act. Therefore, the struggle is very keen. On one scientific council, I recall, an entire 12 aspirants fought for an order. It was impossible to get into the hall. It was packed..."

One important detail: at FTI the goal-oriented laboratories combine not only the applied, but also the theoretical. At first glance, this contradicts common sense: how can one

take responsibility for solving a theoretical problem in a certain time period? "It is quite possible," they explained to me. "If there is a problem, it means there are also ideas on how to solve it. Thus, a competition and contract are possible. Of course, it is for a longer time period than applied workers have—up to 5 years."

This year is not one of the easiest for the institute. In connection with conversion to cost-accounting, it was necessary to rewrite all previously concluded contracts. Due to this, the collective risks going into next year without fully guaranteed financing for its work. They have to get money through "sweat and blood." There are departments that are financed at only 60 percent for the time being. ("There is even one," Zelenskiy laughs, "that was at 8 percent for the first quarter!") However, the situation at the institute is positive on the whole: figuratively speaking, at "comparable prices" the overall work volume has increased by 8 percent.

The institute could make life noticeably easier for itself, if it would relinquish its traditional broad profile: right now, it is doing research in seven main scientific directions. This matter has been discussed many times already and there has been no shortage of suggestions to cut off the "dry branches." Nonetheless, a different viewpoint prevailed: the basis of a comprehensive approach to problems lies in broad exploratory work. Understandably, far from all of these seven scientific directions attract practical consumers. However, the institute leadership is consciously redirecting funds and resources from "productive" into less (for the time being?) popular directions.

"Today, many are opposed to constructing nuclear power plants," V. Zelenskiy continues. "Hence the decline in allocations for research in this field. However, there are no real alternatives to nuclear power. Therefore, we are supporting a number of research groups ourselves. It is easy to lose a level, but far more difficult to return to it..."

What does the institute expect in the future? The subject area is basically staying unchanged. The number of personnel is frozen. So, the main reserves for raising efficiency lie in the use of new organizational principles. It is possible, the scientists believe, to convert the institute into an association of fairly independent scientific subdivisions managed by a directorate.

Proposal to Restructure Latvian Science Establishment

907A0053A Riga SOVETSKAYA LATVIYA in Russian 24 Oct 89 p 3

[Article: "Proposals on a New Mechanism of the Management of Science in Latvia"; first paragraph is SOVETSKAYA LATVIYA introduction]

[Text] The session of the General Assembly of the Latvian SSR Academy of Sciences is being held on 26 October. Proposals on a new mechanism of the management of science in Latvia will be discussed at it. A joint commission of scientists of the Academy of Sciences, the Union of Scientists of Latvia, higher educational institutions, and sectorial scientific research institutes of the republic formulated them under the supervision of Vice President of the Academy of Sciences Yanis Liyelpeter. Academicians Yanis Liyelpeter and Elmar Gren will deliver the main reports. We are publishing the new concept for discussion by the community of the republic.

I. The Basic Principles

The existing system of the management of scientific research does not ensure the achievement of the main goal—the consolidation of the scientific potential (the Academy of Sciences, higher educational institutions, sectorial scientific research institutes) of the republic and its optimum use in the interests of the development of the national economy and culture. Scientific research is acquiring particular importance during the changeover of the republic to cost accounting.

The isolation of the evaluation of the themes of scientific research from the existing system of its financing is the main shortcoming of the former formal coordination of scientific research and management of science. For the most part research, which was financed from the USSR state budget within the framework of departments (the Academy of Sciences, higher educational institutions, individual fields of science), was included in the coordinating plans. Research, which is financed by production sectors and enterprises, was also included. Moreover, the very procedure of evaluation was oversimplified and had a very conditional effect on the continuation of research, the fulfillment of recommendations was not mandatory.

At the present stage of the development of science and the national economy of the republic the following basic principles of the coordination of scientific research and the management of science are being advanced:

1. It is necessary to link the system of management and coordination with the system of financing.

2. The system of management and coordination should be democratic. Specialist-scientists formulate proposals on the financing of scientific fields, basic directions, programs, and individual studies. Financial assets are allocated for research on the basis of the level of development and the prospects of the fields.

3. That portion of the scientific research, which is financed from the state budget of the republic and other sources of the republic level, is included in the new system of management, which is being examined. For the most part this is basic research. The system does not applied to the research, of which operations under contract with clients within the republic and outside it and research within the framework of all-union and international competitions are the source of financing. However, these operations hold an important place in the provision of science of the republic with assets. It is necessary to use extensively the opportunities to participate in all-union programs on a competitive basis, as well as to appreciate the opportunity to participate in international scientific programs and competitions.

4. In the financing of scientific research it is necessary to use the competitive system extensively.

5. For the enlistment of scientists in the fulfillment of specific jobs it is necessary to use a system of contracts. Changes in labor legislation are necessary for this.

6. It is necessary to establish a system of scientific evaluation with the paid work of experts; the task of evaluation is to provide conclusions on specific applications for scientific research and on the results of research.

7. When establishing the system of coordination and management it is advisable to use the existing structures of science—the Academy of Sciences, sectorial scientific research organizations, interbranch complexes, and other organizations that are responsible for the development of science.

II. The Functional Model of the Mechanism of Management

The principle, in conformity with which assets from the republic budget are allocated by means of the system of competitions and contracts, is the basis of the new mechanism of the coordination and management of new research. It, in turn, is based on the comprehensive evaluation of the plans of new research and the results of past research of collectives and individual scientists.

The Latvian SSR Supreme Soviet allocates money for scientific research from the budget. The Latvian Council for Science submits proposals on the amounts of assets being allocated and their distribution.

The Latvian Council for Science is closely connected with the Commission for Science of the Latvian SSR Supreme Soviet (currently the Commission for Science, Public Education, and Culture), interacts with it, and reports back on its activity.

The main task of the Latvian Council for Science is concern for research which is necessary for the development of science, culture, and the national economy of the republic. At the center of attention of the council for science is research, which does not have another source of financing besides the republic budget, as well as applied research and development, in the results of which the republic is interested, but enterprises and firms are financing them inadequately or are not financing them at all (due to the vagueness of the possible results and owing to other reasons). On the instructions of the Latvian SSR Supreme Soviet the council for science also analyzes other scientific research.

The recommendations of the Latvian Council for Science are based on the conclusions of experts. The council establishes the system of evaluation.

III. The Basic Stages of the Reform and the Corresponding Measures

The changeover to the new methods of the management and financing of science should be accomplished in several stages in conformity with the increase of the scientific potential and the amounts of financing, as well as the implementation of the concept of the economic independence of the republic.

1. The first stage is the establishment of the Latvian Council for Science. The discussion of the new mechanism at a session of the General Assembly of the Latvian SSR Academy of Sciences with the participation of representatives of the leading scientific institutions of the republic. The submittal to the Latvian SSR Council of Ministers of proposals on the new mechanism of the management of science.

2. The second stage is the establishment of councils of experts for fields of science and programs. The council for science begins work in 1990. It submits to the Latvian SSR Supreme Soviet a well-reasoned report on the necessary amount of financing and addresses to the Latvian SSR Council of Ministers a request to allocate assets for the first evaluations.

3. The third stage—the new mechanism of the management of science takes effect in 1991. For the most part the assets for 1990 are still allocated according to the former principle. In case of the allocation of additional assets competitions on additional themes of the second half of 1990 will be announced as an experiment. The council for science participates in the formulation of a Latvian SSR draft law on science.

4. The fourth stage is the systematic evaluation of all scientific research, which is financed from the republic budget, and the halting of the financing of research, which is not urgent and is of low quality. The allocation of assets for scientific research takes place only in conformity with the new system.

IV. The Latvian Council for Science

1. The size of the Latvian Council for Science is roughly 40 people, of whom approximately half of the council members (21) are elected, while the other half (19) are appointed by leading scientific centers. The members are elected or appointed for 3 years, but for no more than two terms. Every 3 years half of the membership of the council should be replaced.

2. A special working group made up of eight people (four representatives from the Academy of Sciences and four from the Union of Scientists of Latvia) establishes for the first time the Latvian Council for Science. This working group drafts the statute on elections and first organizes the election of council members, then the nomination of members to be appointed. The voters (collectives of institutes) should be grouped by related fields of science. The working group has the right to submit proposals for the election and appointment to the council of specific candidates, on the basis of the contribution and competence of these scientists in matters of the organization of science. (The voters have the right to nominate alternative candidates.) The functions of the working group are confined to this—in the future the council itself performs these functions, based on the statute which was prepared and confirmed earlier.

Alternative version of the establishment of the Latvian Council for Science.

Each scientific institution (institute, higher educational institution, and others) nominates its own representatives (1 per 100 candidates of sciences and 1 per 10 doctors of sciences) to the council of electors for science. The council of electors elects 21 members of the council for science for 3 years, on the basis of the proportions between the basic fields of science. Annually, after hearing the report of the council for science, the council of electors replaces the members of the council for science, whose activity is unsatisfactory.

3. The norms of representation for elected members of the council are: 1 per 400-500 candidates of sciences and 1 per 40-50 doctors of sciences, who actively work in science.

4. In addition to the members of the council, who have been elected from its collectives, the Academy of Sciences (the General Assembly of the Academy of Sciences, the Presidium of the Academy of Sciences, and so forth) appoints eight council members; the Union of Scientists of Latvia appoints two members; the Latvian State University (the Council of the Latvian State University), Riga Polytechnical Institute, and the Latvian Agricultural Academy appoint two members each; the Riga Medical Institute, the Riga Red Banner Institute of Civil Aviation Engineers imeni Leninskogo komsomola, and the State Planning Committee appoint one member each. The right of the Academy of Sciences, the Latvian State University, Riga Polytechnical Institute, the Riga Medical Institute, the Latvian Agricultural Academy, and the Riga Red Banner Institute of Civil Aviation Engineers imeni Leninskogo komsomola to appoint council members is based on their real contribution to science of the republic at present.

5. The work of the members of the Latvian Council for Science and experts is paid for. During the initial period the staff of the Academy of Sciences supports the technical work of the council.

6. The principle, in conformity with which all its activity is open: all recommendations are published in good time in the press for discussion by the scientific community, ensures the monitoring of the activity of the Latvian Council for Science. The council regularly informs the Presidium of the Academy of Sciences and the Council of the Union of Scientists of Latvia about its activity.

V. The Functions of the Latvian Council for Science

1. As far as possible to change over in the shortest time to the optimum amounts of financing of science as a whole and by fields.

2. To establish a competent group of professional scientologists (by means of competition) made up of about 10 people, the task of which is to study and forecast the development of science of Latvia and its fields.

3. To prepare proposals on the draft law of the Latvian SSR on science. The law should envisage: the formation of the budget assets which are necessary for the financing of science (within the framework of the republic tax system); the specific nature of the taxes in the area of science, so that the organizations, which are engaged in applied research and development and do not work for the benefit of the republic, would pay more taxes than those which work for the benefit of the republic; the job placement of scientists who under the conditions of the system of competitions and contracts might remain without work—for some time (approximately 3 years) they could receive minimum salaries in order to have the opportunity to participate in the preparation of new plans of research for other competitions.

Not less than 40 percent (during the initial period, 50-60 percent) of all budget allocations, which are intended for science, should be placed directly at the disposal of scientific research institutions. They are used for the financing of research in conformity with the decision of the scientific councils of these institutions and for the payment of minimum salaries to researchers who have not won competitions.

4. To substantiate the necessary amounts of financing and to submit proposals on them to the Latvian SSR Supreme Soviet.

5. To see to the assurance of the necessary pace of development of science in the republic.

6. To prepare proposals on the formation of other funds of the financing of basic research.

7. To formulate and approve the priority directions of scientific research in the republic, organizing in advance their discussion by the community.

8. To organize the formulation of projects and programs for the basic directions of development of the natural sciences and humanities in Latvia.

9. To carry out the transfer of the allocated assets to institutes, scientific supervisors of laboratories and scientific groups, and individual scientists. The performer of a specific project or specific research (a collective or an individual scientist) is the recipient of the assets.

10. At the first stage of the reorganization of science of Latvia it is advisable to use the already existing structures, while ensuring the stage-by-stage changeover to the optimum arrangement.

11. To accomplish the maximum convergence of the Academy of Sciences and higher educational institutions, especially during the changeover to a two-level higher education (the Academy of Sciences jointly with the chairs of higher educational institutions, which are the strongest on the scientific level, carry out the training of students at the second level).

12. To halt ineffective research, and to turn the assets over to the disposal of the Latvian Council for Science for new themes and the establishment of new scientific collectives on a competitive basis.

13. To develop an alternative mechanism of scientific research orders.

VI. The Councils for Fields and Programs of Science

1. The Latvian Council for Science establishes councils, for example, for the following fields of science:

1) physics and mathematics; 2) machine building and power engineering; 3) informatization; 4) other technical sciences; 5) chemistry; 6) biology; 7) biotechnology; 8) ecology; 9) medicine; 10) agriculture; 11) forestry; 12) economics of the national economy; 13) the humanities; 14) the social sciences and other fields of science.

2. The principles of the establishment of the councils for fields of science and programs are similar to the ones, in conformity with which the Latvian Council for Science is established. For example, the leading scientific centers of this field appoint half of the members, scientists of the field elect the other half of the members from experts selected in advanced (the selection is made by a working group). Any skilled scientist of the corresponding field can nominate himself as a candidate expert.

3. The councils for fields of science and programs formulate the scientific policy and programs of the corresponding fields of science. The Latvian Council for Science allocates assets for research on the basis of the proposals of the council of a field (an individual collective, an individual scientist, the council of a program) and the conclusions of expert groups.

Tashkent Cooperative Develops Fiber Optics, Laser Technology

907A0053B Tashkent PRAVDA VOSTOKA in Russian 26 Oct 89 p 2

[Article by UZTAG correspondent Yu. Kruzhilin under the rubric "Returning to a Theme": "The Adventures of the Laser Beam. An Instrument Developed by Scientists of Tashkent State University Will Help to Speed Up the Introduction of Fiber Optics"]

[Text] Not even the very article " 'Refusers' and Technical Progress," which was printed in a number of newspapers, evoked this reassuring response, but the brief commentary of Uzbek SSR Deputy Minister of Communications, which is published below, did. Vladimir Aleksandrovich declared:

"Fiber optic cable is very expense, but in the end its possibilities recover the spent assets. The chronic shortage of instruments, which are 'mated' with lightguides, remains the main obstacle to the introduction of this type of communications. It is necessary to increase their production by an order—by about tenfold."

Soon after publication the telephone rang in the editorial office.

"We have what communications workers need."

Let us recall: the production of fiber optic cable has been organized by the Kristall Cooperative of the Tashkent Sredazkabel Association. Not an electric signal, but a laser beam is transmitted through such a wire. This practically eliminates static in telephone communications. It is possible to conduct up to 30,000 conversations simultaneously. A most valuable metal—copper—which communications workers are now burying by the many tons in the ground, becomes available.

The difficulty is to "drive" the light beam, which carries the signals, into this very optical wire. All the same laser radiation is not a knitting needle, it spreads slightly while traveling in space. And, therefore, it enters this wire not entirely, but only in small part. A significant portion of the laser radiation and, with it, the information is lost.

There are instruments which help to reduce the losses. But, first, there are not very many. Second, there are very few Soviet ones, while foreign ones are expensive and there is no foreign currency to buy them. Therefore, the clients of optical cable are canceling their orders, the Kristall Cooperative is threatened with ruin, the introduction of fiber optics is threatened with disruption.

"We are offering a solution," says Aleksandr Vakhidovich Khaydarov, docent of Tashkent University, who is in charge of a laboratory at the Institute of Applied Physics there. "There is a domestic instrument for the 'pumping' of a laser beam into an optical wire."

This instrument—a fiber optic laser module—together with A. Khaydarov recently made a trip to America—to Stanford University in California.

At the conference "International Laser Science," where the Tashkent scientist showed it and delivered a report, this work amazed many people. A small box (a weight of 15 grams, a length of 25 millimeters, a width of 15 millimeters, and a height of 10 millimeters) "drives" into the wire up to 60 percent of the laser radiation, while for the best Japanese devices this indicator does not exceed 40 percent.

Omitting the technical details, let us merely add that at the same time the creators of the instrument learned to process the tip of the finest optical wire, turning it into an efficient receiving lens, and developed a design method, which makes it possible to do this with reference to any types of fiber cable.

Moreover, they also produced their instrument themselves for a narrow group of clients, of whom they have now been deprived in connection with the restructuring of a number of sectors of industry.

Thus, on the one hand, there is a sector that urgently needs the instrument. On the other, there are people who are looking for someone, to whom to offer such an instrument. Will a meeting take place?

But for the present the physicists of Tashkent State University are preparing to take the next step.

Again, without going into the details, we will say: since it is possible to feed into an optical cable up to 60 percent of the power of a laser, it has become expedient to use for communications far more powerful radiation sources. That is, to speed up sharply the transmission of information, to lengthen the hops, and on this basis to obtain a

large saving of assets (let us recall the complaints of the communications worker about the expensiveness of optical cable).

It must be admitted, true, that this theme will not provide an immediate return. It is very promising, but unmanageable for the cost accounting laboratory: it requires basic research work for about 2 years. Hardly any client will invest money in this. Allocations from the budget, about 60,000 rubles, are needed here. Without them the laboratory, just as the Kristall Cooperative, will find itself on the verge of bankruptcy and liquidation.

Now they have received here a rather good order from the Geoinformsistem All-Union Scientific Research Institute—geologists intend by means of the Tashkent laser module to derive information from geophysical wells....

American physicists were at the laboratory and said: with your fellows and with our equipment it would be possible to reduce mountains....

This is not the first year that our physicists have requested these 60,000 rubles from the budget. In the offices of the former Ministry of Higher and Secondary Specialized Education, now the Uzbek SSR State Committee for Public Education, thus far they have heard at worst "there is no money" and at best only promises....

Kazakh Design Bureau Chief Lauds New Financing

907A0042A Alma-Ata PARTIYNAYA ZHIZN KAZAKHSTANA in Russian No 9, Sep 89 pp 14-18

[Article by Candidate of Technical Sciences D. Mukanov, director of the Special Planning and Design Bureau of the Chermetavtomatika Scientific Production Association: "Cost Accounting Is a Catalyst of Scientific and Technical Progress"]

[Text] The Special Planning and Design Bureau (OPKB) of the Chermetavtomatika Scientific Production Association was one of the first among the scientific research and planning and design organizations of the republic to change over to cost accounting and self-financing. The Special Planning and Design Bureau is an integrated organization, which performs the entire cycle of operations, from research, engineering, and design to the small-series production and introduction of special means and systems of automation in ferrous metallurgy. A scientific idea here passes as if like in a relay race from the scientist to the developer, from him to the designer, then to the process engineer and the worker and, finally, as a finished item gets to the plant shop. The average period of the development of innovations does not exceed 20 months, while for the country, as is known, this time for the present comes to 4-5 years.

Incidentally, just recently we also worked at the same unhurried pace. For example, the development of one of our instruments, a neutron moisture gauge, which is now being extensively duplicated, lasted from 1979 to 1983. At that time only a few people were engaged in designing, the capacity of the experimental department did not come to even a tenth of the present one. With time, in order to speed up the work, we set up design subdivisions, which specialized in metallurgical process stages, purposefully selected personnel, organized an experimental works, and supplied it with the necessary equipment. And soon we coped in just 1.5 years with the development and introduction of a system of the monitoring of the burnout of air tuyeres of blast furnaces. Our successes did not go unnoticed, and we began to receive a large number of proposals from numerous clients, even from abroad for the production of various instruments. They know our gas analyzers, calorimeters, and automatic control systems (ASU's) in Bulgaria, India, Nigeria, and other countries. But even such, it would seem, a most short time of the output of a scientific product did not satisfy us. The times required the rapid retooling of all the sectors of the national economy, and we decided to achieve the maximum possible efficiency of scientific research and the quickest introduction of its results in production. And precisely the changeover to cost accounting, with its inherent system of material stimulation and with extensive opportunities for the free and creative competition of minds and talents, completely conformed to our intentions.

What did cost accounting change at the Special Planning and Design Bureau? It forced people to work for the achievement of such goals as "a high scientific and technical level of products," "the effectiveness of development," "competitive ability on the market," and so on, economic laws themselves. Such categories as "commodity," "market," "realization," "profit," and "profitability" became firmly established in our life. As a result all our affairs as if received an additional internal stimulus, which sped up the flow of all production processes. We were able to achieve record short times in the filling of orders of enterprises. Here is a graphic example.

At one time complaints about the quality of argon, which was being supplied by the Soviet Union, began to be received on the part of foreign firms, particularly Finnish firms. It was necessary to develop in the shortest time a high-precision instrument for the determination of the content of trace contaminants of nitrogen in argon. Central institutes requested for development not less than 3 years. We undertook this work and in 9 months developed an instrument, which is now being widely duplicated in the sector and has even been certified as a checking aid.

The talent of developers was revealed, T.S. Namazbayev, V.P. Dombrovskiy, Ye.B. Plavinskiy, and A.V. Tskhay, young specialists and the authors of interesting developments, appeared. They all defended candidate dissertations and today manage departments. Designers V.P. Mikhaylov and L.M. Malikov were in charge of the Karaganda Pilot Plant and the start-up and adjustment administration, which were established on the basis of the corresponding subdivisions of the Special Planning and Design Bureau.

Having such personnel and such developments, we are not experiencing now a shortage of clients. Many more orders have been received from metallurgical plants for the development of innovations than in past years. Suffice it to say

that the Special Planning and Design Bureau in 1989 has a backlog of orders from enterprises of the sector for the conducting of scientific research and experimental design work worth 4 million rubles and for 1990—more than 5 million rubles. And this is under the conditions, when clients for the most part have also changed over to cost accounting and have ceased to buy unnecessary products with their earned money.

But what did cost accounting give people?

The main thing, in my opinion, is that it awakened in them the sense of being the master and of realized responsibility for the results of labor. The comprehensible and clear dependence of remuneration on the end result stimulated the social and creative activity of people. The exactingness of staff members themselves toward the organization of labor increased, the attitude toward shortcomings became more pointed. During the period of the changeover to cost accounting alone personnel of the Special Planning and Design Bureau submitted more than 40 suggestions on the improvement of work and the elimination of various shortcomings in the organization and remuneration of labor and on the expansion of the sales market.

Absolute power was transferred to the council of the labor collective, which on a competitive basis conducted the election of the director of the Special Planning and Design Bureau and the heads of the departments. Glasnost increased. Under the conditions of the development of democracy extensive opportunities appeared for occupational and job advancement, especially for young people. All this enabled us to improve drastically the socioeconomic indicators.

I will cite some figures which illustrate what has been said. Last year we completed jobs worth 3,582,000 rubles as against 2,172,000 rubles the preceding year, which is nearly 40 percent more. The payments of all types of increments and bonuses from the material incentive funds last year came to 219,200 rubles as against 87,800 rubles the preceding year. The average wage increased by 30 percent, while the increase of labor productivity came to 150 percent. Last year we earned a profit of 683,000 rubles, of which we were able to deduct a part for the social development fund, for the expansion of production, and for new equipment. We allocated assets for the purchase of apartments in a young people's housing cooperative.

There were quite a number of difficulties when changing over to the new conditions of management. I will dwell on two of them. The poor economic training of personnel and the lack of skills and experience under the conditions of real commodity-market production gave us trouble most of all. We had to simultaneously study and work, to draft and introduce a large number of statutes and methods, which concern the organization and remuneration of labor, planning, accounting, and control. All the "general-purpose" procedural instructions and recommendations, which arrived from the center, had to be revised with allowance made for the characteristic conditions and social interests of scientists, engineers, designers, workers, and employees. We carried out the changeover to fundamentally new commercial relations among the coperformers within the Special Planning and Design Bureau, as well as with the client.

Much energy had to be expended in order to overcome the complex psychological situation which had formed in the organization at that time. For perestroyka affected the interests of nearly every member of the collective. The system of dependence and unwarranted leveling in the remuneration of labor, which had existed for decades, collapsed and the reevaluation of personnel and the breakdown of the customary style and methods of work occurred. Practical experience showed that the former unanimity of staff members, as it turned out, now does not exist, the stereotypes of thinking and behavior broke down, the "pluralism" of both thought and actions came into its own, and emotions and criticism raged. Demagogs and idle talkers woke up on the wave of universal enthusiasm. At times it even seemed to me (and I had worked in the organization as director for more than 20 years) that we had switched too early from centralized command methods to economic methods and to democracy. At times it seemed that the universal chaos would swallow up everyone, especially during the election. Three people ran for the position of director, in one of the departments four people ran, and not everywhere did the "necessary" people run. In the experimental department, for example, the workers voted for a person from outside, who had promised them a wage increase, and "blackballed" an experienced manager, who had guaranteed them the same thing, but said that it would be necessary to do some work for this. For three months the workers personally experienced the rhetoric of the new chief: the assurances, which were not backed by organizational and technical steps, remained words, the breaking of contractual obligations to the client led to the deprivation of additional earnings—and the collective denied the new manager confidence. Were there costs? Yes. However, the gains of democracy proved to be many fold greater. The workers saw their mistake, but at the same time for the first time saw themselves as the masters, on whom the correction of the blunder also depends.

The joint work of the party committee, the council of the labor collective, the administration, and public organizations made it possible to guide public opinion and to promptly make decisions that conform to the interests of the matter. Under the new conditions, when staff members began to be enlisted in the planning of development and the distribution of material wealth and in the formation of management organs, it was very important to achieve the awareness of each person about everything happening at the Special Planning and Design Bureau and about the prospects of the organization. For these purpose we used the potentials of visual propaganda, local radio, surveying, and sociological studies and organized regular meetings with the collectives of subdivision on questions of interest to them. The prestige, experience, and knowledge of leading specialists of the Special Planning and Design Bureau, the communists A.K. Stroykovskiy, chief engineer, S.A. Askeyeva, head of the economic planning

department, and R.R. Rakhimbayev, head of the sector of technical and economic substantiations and forecasting, the nonparty members A.A. Michkov, head of the experimental department, and G.S. Pykhtin, head of the technical department, and others played an enormous role in organizational, technical, and educational work.

Economic training became subject-oriented. Now its themes completely conform to the democratic methods of work. Courses of economic knowledge have been organized in every subdivision, personnel of the economic planning service and leading specialists act as propagandists. The seminar "Perestroyka at the Special Planning and Design Bureau" operates for the communists. The themes of the seminar encompass the questions of the use of the internal reserves and the independence of enterprises, cooperation, the task of public organizations under the new conditions, and the role of the Special Planning and Design Bureau in the development of science-intensive works in the region, and others.

Cost accounting showed that the work being performed does not always yield the planned results. We began to seek the causes of the irregularities. Here the problems, which we had previously missed, came to light. For example, of the 400 staff members 68 have a length of service at the Special Planning and Design Bureau of less than 1 year, while another 92 have a length of service of less than 3 years. It is natural that they knew poorly the past of our organization, its present, and especially its prospects. It was difficult for them to determine their position in the changing situation, they perceived innovations with difficulty. Therefore, we decided to acquaint the novices with the history, basic operations, and plans of the Special Planning and Design Bureau and to keep their life, concerns, and problems constantly in view.

More than 70 leading specialists work in the organization, but, as it turned out, a significant portion of them are not taking a proper part in educational work and at times display infantilism in social life. Meanwhile, it is difficult to overestimate their role as educators, for they associate most often with rank and file specialists, each of them can become a good tutor and a stern judge, in short, can influence the formation of characters and a healthy public opinion in the collective. We have repeatedly discussed these questions at production conferences and party meetings. And many people, as we expected, have become assistants in perestroyka.

Concerning another reserve. At the Special Planning and Design Bureau 18 public organizations, as members of which about 100 people (this is nearly a fourth of the collective) have been elected, are operating. When it came to the test it turned out that a large portion of the "elect" are not performing their public duties. A serious discussion took place at a party meeting, the rotation of the people, who are indifferent to the concerns of people, was begun. As a result we were able to enlist in the perestroyka of the Special Planning and Design Bureau the informal leaders of various social groups—veterans, women, young people, and other activists.

Having well-trained personnel, we boldly agreed to the broadening of the independence of the cost accounting departments. Today the collectives of the subdivisions settle themselves the questions of the organization of labor, hiring, the monitoring of the consumption of materials and the maintenance of equipment, the determination of the duration and the time of the granting of leaves, the amounts of remuneration within the collective, and so on. Of course, the increase of independence also requires responsibility: they pay for all miscalculations and the harm done to the Special Planning and Design Bureau by means of their own profits.

The changeover of ancillary subdivisions to cost accounting also became another step forward in the introduction of the new economic forms of management and administration and in the development of new advanced interrelations among departments. Now in accordance with direct contracts with developers the department of material and technical supply is carrying out the supply of complete sets; the patent services is conducting patent research and the official registration of applications for an invention and licenses. We prepared and submitted for approval all the substantiations, standards, and price lists as a result of intense labor, research, and disputes of the interested services, planners, and the developers themselves.

The economic services and the operations and technical department are preparing to accept on a collective contract equipment and production premises, seeing a direct advantage from this—the increase of material interest and possibilities of development and the reduction of nonproductive, overhead expenses.

The fact that the Special Planning and Design Bureau itself undertook the special-purpose training of skilled personnel for its subdivisions, testifies to the degree of our independence and to the genuine practical attitude toward our own business: at our scientific production base we organized affiliates of the Chair of Radio Physics of Karaganda State University and the Chair of Information and Computer Technology of Karaganda Polytechnical Institute. By this we are accomplishing in practice the tasks of the integration of science and production and the improvement of the quality of the training of personnel for the sectors of the national economy and, of course, for ourselves as well. For during studies and practice our lecturers will be able to select successors who are worthy of them.

Now we are working under the conditions of the liberation of the energy, initiative, and thought of hundreds and hundreds of talented specialists. Cost accounting razed departmental barriers, now we can conclude contracts with any organization regardless of departmental affiliation. The scientific potential, which has been accumulated by us to date, the established pilot experimental base (with a capacity of more than 1 million rubles a year), and the developed instruments and systems can be of great benefit to everyone and can raise the level of automation of all the enterprises of Kazakhstan.

What can our collective offer plants and factories of the republic? For chemists, miners, power workers, workers of the construction industry, and the agroindustrial complex we can develop and produce at the level of world standards high-precision instruments for the quality control and accounting of products and the control of technological processes which make it possible to save fuel and energy resources. We can sell designing and planning documents and reliable items to every consumer on a contractual basis. The Special Planning and Design Bureau is capable of organizing the production and delivery to the public education system—schools, vocational schools, and higher educational institutions—of computer devices and stands for the conducting of laboratory lessons on electronics and information science and for display classrooms. Code door locks and intercom devices like the Domofon, which were developed by our young specialists, are enjoying success among new tenants. Many problems still exist here (the production capacity is inadequate, there are no premises and high-precision machine tools), but we will try to overcome them.

I want to stress that we are striving to work and are working at the front line of scientific and technical progress. We see the future in the development of new equipment on an industrial basis. We have prepared scientific and technical programs that include the development of instruments on the basis of the latest achievements of physics and electronics—such as laser gauges of technological parameters and software-hardware complexes, of which the automated control systems of burdening based on weighing-type feeders (UVD's) with terminals of the computer link with the object, which are now being introduced at blast furnaces, can serve as an example.

Cost accounting is also giving rise to a number of social and psychological problems, which we cannot but note. Group egotism, the opposition of personal interests to collective interests, and the aspiration to dispose of unearned assets have appeared in a number of departments. In pursuit of immediate advantages several collectives are not thinking about the future. As a consequence scientific themes are becoming petty, which can lead to losses in the future. For example, the collective of the rolling department got carried away with easy, but well-paying jobs on the provision of technical assistance to metallurgical plants, while the department of automated control systems of the technological processes of steel making engaged in the development of sensors and instruments instead of the devising of integrated automation systems. In case of an orientation toward an immediate advantage scientific research and exploratory operations disappear from the plans. For their performance under the conditions of cost accounting the collective itself should earn the money, but some people are not very readily striving for the establishment of full-fledged funds of their own long-range, strategic development. In order to limit the effect of such negative trends, we raised the status of the scientific and technical council, which has begun to determine the strategy of the performance of scientific research work. Already this year the scientific and technical council distributed on a competitive basis among subdivisions assets for the performance of research work on gas analysis and the use of semiconductor lasers for determining the speed of hot-rolled strips.

New steps on the development of cost accounting have been taken—today the organization is operating under the conditions of a collective contract. The principles, which were incorporated when introducing this model, are the following: the further decentralization of management, the establishment of contractual relations among subdivisions on the basis of contract prices, and collective responsibility for the results of work. True, the habit of being only a performer, which existed in past years, is also making itself felt now. However, reassuring changes are noticeable in the psychology of people and in the development of the enterprise, independence, and responsibility of developers. The economic search and the honest struggle are continuing.

Reducing Lead Time for New Technology

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[Report by M. Panova on meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy: "Scientific and Technical Progress—Points of Growth. Notes From the Meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy"; first five paragraphs of first article and first paragraph of second article are EKONOMICHESKAYA GAZETA introduction]

[No 41, Oct 89, pp 15-16]

[Text] How is the acceleration of the pace of scientific and technical progress to be ensured? Where are the painful spots of the complex and multilink "science-technology-production" chain? Why under the conditions of radical economic reform are the questions of the modernization of the production potential on a qualitative new basis being settled slowly just as before?

The participants in the recent meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy, which was held under the chairmanship of Member of the Politburo of the CPSU Central Committee and Secretary of the CPSU Central Committee N. Slyunkov, in their statements devoted the main attention to the search for answers to this vital questions and to the formulation of constructive proposals, which are aimed at the improvement of the management of scientific and technical progress.

The preparation for the meeting was protracted and serious. The materials on questions of scientific and technical progress, which had been received by the commission from party committees, departments, ministries, scientific organizations, economic managers, scientists, and specialists, were examined and generalized. Among these materials are suggestions of the Ukrainian and Belorussian CP Central Committees, the USSR State Committee for Science and Technology, the USSR State Planning Committee, the USSR Ministry of Finance, the USSR State Committee for Statistics, and the USSR Academy of Sciences.

Vice President of the USSR Academy of Sciences K. Frolov, a commission member, delivered the report at the meeting. There participated in the discussion of the issue: P. Amelchenko, general designer for universal row-crop tractors of the USSR Ministry of Agricultural and Tractor Machine Building; M. Aleksandrov, general director of the Nauchnyye pribory Interbranch Scientific Technical Complex of the USSR Academy of Sciences; Yu. Skokov, chairman of the board of the Kvantemp Interbranch State Association; V. Trefilov, general director of the Poroshkovaya metallurgiya Interbranch Scientific Technical Complex of the Ukrainian SSR Academy of Sciences; Yu. Kosyak, general designer for turbines for nuclear power plants of the USSR Ministry of Heavy, Power, and Transport Machine Building; USSR Minister V. Durasov, first deputy chairman of the USSR State Planning Committee; Yu. Yakovets, head of a chair of the Academy of the National Economy attached to the USSR Council of Ministers; A. Ishlinskiy, chairman of the board of the Union of Scientific and Engineering Societies; Deputy Chairman of the USSR Council of Ministers and Chairman of the Bureau of the USSR Council of Ministers for Machine Building I. Silayev; President of the USSR Academy of Sciences G. Marchuk; USSR Minister of Health Ye. Chazov; Chairman of the Moscow City Soviet V. Saykin; Deputy Chairman of the USSR Council of Ministers and Chairman of the USSR State Committee for Science and Technology N. Laverov; USSR Minister of the Electronics Industry V. Kolesnikov; First Secretary of the Kabardino-Balkar Oblast Committee of the CPSU Ye. Yeliseyev; Deputy Chairman of the USSR Council of Ministers L. Abalkin; Chairman of the USSR State Committee for Standards V. Sychev; and First Secretary of the Kemerovo Oblast Committee of the CPSU A. Melnikov. As a result of the discussion the basic directions of work, which require particular attention of communists who work in the corresponding departments, at enterprises, and in organizations, were determined and were specified in the fundamental aspects.

In starting in today's issue the coverage of the materials of the meeting, the editorial board proposes to continue these publications and to reflect the opinion of all the discussion participants.

The Choice of Priorities

Opening the meeting, Member of the Politburo and Secretary of the CPSU Central Committee N.N. Slyunkov noted that it is possible to accomplish the task posed by the 27th party congress of carrying out in 10-15 years the radical modernization of the national economy of the country only on the condition that the entire set of organizational, economic, and social factors are put to work. It is possible to do this only on the basis of the sharp increase and the efficient use of the scientific and technical potential and scientific developments.

Science should play a key role in the development of fundamentally new types of technology and equipment and in the solution of all the social problems, on which the party and the country are working. If we take world experience, in recent decades there has been established in all industrially developed countries a fundamentally new way of life, which is due to the new role of scientific research and development and their extensive introduction in production, which in many respects determined the technical, economic, and social level of development of these countries. It is possible to say that science has developed into an important structure-forming factor of the national economy, which is connected with the explosion of the scientific and technical revolution.

In the USSR such a task until recently was worked on slowly and today is also being worked on spiritlessly. The lag in the scientific and technical sphere behind the United States, Japan, and other developed countries is not decreasing, but is even increasing. Many attempts have been made in recent times in the country to accelerate

scientific and technical progress. The priority allocation of resources for basic research is incorporated in the Concept of USSR Economic and Social Development, which is defined up to 2005. It is planned to strengthen the material and technical base of science.

For this year the budget allocations for the academic sector were increased by 34 percent, including 54 percent at the USSR Academy of Sciences. As a whole the increase of financing of science will come to more than 12 percent. The serious decree of the USSR Council of Ministers on the changeover of scientific organizations of the USSR Academy of Sciences, the academies of sciences of the union republics, and the system of the USSR State Committee for Public Education to the new methods of financing and management was adopted in October of last year. Thereby the fundamental foundations of the improvement of the planning and financing of basic research were laid, the material interest of scientists in a higher level of developments was increased, and the strengthening of the connection of basic and applied science was envisaged.

Thus, the prerequisites of the new material, organizational, and economic bases for the development of basic research were formed. At the same time, for the effective implementation of these prerequisites along with the strengthening of the resource base of science the radical restructuring of many established forms and methods of work of scientific organizations is also required. First of all it is necessary to strengthen decisively the practical orientation of basic scientific research and development. They are called upon not only to extend the theoretical knowledge of the laws of nature and society, but also to respond to the vital socioeconomic problems that have come to face the country.

Much is being done, and positive experience of such stable interaction of our large-scale science with practice has been gained, for example, in the Ukraine, Belorussia, and Siberia.

It is necessary to group with the shortcomings the lack in the country of a developed system of the choice of priority research directions. The monopoly position of individual scientists and collectives has grown stronger. As a result the principle of competition has begun to disappear from science. The lack of objective criteria of the evaluation of science has given rise to the processes of averaging and leveling in creative work.

Cost accounting and self-financing should play a special role in the use of the scientific and technical potential. Why is the economic mechanism not ensuring the efficient use of scientific and technical developments and poorly stimulating its updating and development? Today this question merits the most serious attention and examination. Apparently, because economic approaches to the management of scientific and technical progress were not incorporated in the prevailing model of economic management. In practice no economic mechanisms have been put into effect. Tax levers are lacking. A depreciation and monetary policy has not been put into effect. Pricing does not work. The wage does not stimulate. In short, it is not by chance that the national economy in practice does not grasp scientific and technical progress.

At the start of perestroyka we declared a new structural policy, specified the priorities of the allocation of resources, a policy of energy conservation, and much, much more. What are the results? An improvement has not occurred. As before, the reluctance to deal with the questions of scientific and technical progress and resource and energy conservation reigns. Hence, there is still no connection of economics with science. It is necessary to correct the formed situation resolutely.

On What Does the Character of Production Depend?

And why is it changing so slowly? In his report Vice President of the USSR Academy of Sciences Academician K.V. Frolov, a commission member, named many reasons. Thus, the economic reform has placed industrial production under conditions, under which managers are not striving for innovations but, on the contrary, are avoiding them. Easier conditions for deriving a profit not by the introduction of new, science-intensive technologies, but by the simple increase of the prices for the products being manufactured are frequently created. The managers of industrial enterprises still do not have an effective stimulus for innovations and the search for new technical solutions. Of course, it is necessary to examine the problems of scientific and technical progress in general connection with the development of the economy of the country and all the changes that are occurring in it.

Unfortunately, during these years the necessary integration of science—academic and VUZ science and industrial scientific research institutes—as had been anticipated, did not occur.

The hopes for scientific technical complexes also were not fully justified. The Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries did not ensure the innovation readiness of the member countries: industry, as before, remains unreceptive to new achievements.

The USSR Academy of Sciences thus far has not fully coped with the direct instructions of the 27th party congress on the development of basic research and its technical orientation, although much has been done in this direction. Departments of the USSR Academy of Sciences—the Far Eastern and Ural—and new centers of the technical sciences, first of all in the field of machine building, were established, new institutes were organized in industrially developed regions. But this is far from enough to fill the gap, which has formed in the chain of scientific and technical progress, and to make up for the harm that was done when about 100 institutes were withdrawn from the Academy of Sciences. These institutes, strictly speaking, also ensured scientific and technical progress in the field of electronics, electrical engineering, control systems, new materials and technologies, power engineering, mechanics, and machine building. The drama of the situation consisted in the fact that they were

transferred from one department to another. Many institutes lost their schools and scientific orientation and lost the best personnel, the effectiveness of research decreased. The Ukrainian Academy of Sciences, where these institutes were retained, was an exception, and that is why worthy results are now visible.

In public opinion the romantic aura around representatives of the technical sciences is declining, a drain of talented young people from academic institutes and graduate studies is being observed. The labor of a scientist, like the labor of an engineer, is becoming unprestigious.

The management of scientific and technical progress remains complicated, awkward, and ambiguous. Thus, today the USSR Academy of Sciences deals with the formulation of basic research programs, while the USSR State Committee for Science and Technology carries out the formulation of scientific and technical programs that are connected with industrial scientific research institutes. The bureaus of the USSR Council of Ministers for machine building, for the fuel and power complex, and for the chemical and wood complex and the technical administrations in ministries are also concerned with scientific and technical progress. The USSR State Committee for Public Education has its own subdivisions which manage scientific research of the higher school. Finally, the USSR State Planning Committee, the USSR State Committee for Computer Technology and Information Sciences, and others are dealing with these questions. It is clear that such a complex system is ineffective.

The improvement of the system of the management of scientific and technical progress must be linked fundamentally with the system of the management of the national economy as a whole. It is necessary to formulate a program of profound structural changes in the interests of the national economy.

Thus far the leading technologies, which were developed at institutes of the USSR Academy of Sciences and industrial scientific research institutes, have not received broad practical use in industry. Hundreds and thousands of most interesting developments continue to remain in laboratories and institutes and are not reaching production.

The capital-worker ratio in science is low—about 10,000 rubles per worker, which is much lower than in industry. In the United States these indicators are approximately identical.

In science monopolism and subordination to departmental and group interests have not been overcome, the competitive system is not working. The existing economic mechanism does not guarantee the interest of industrial enterprises in the acceleration of scientific and technical progress. Due to the imperfection of social policy, the lack of development of the consumer sector of the economy, and the lack of an effective system of stimulation the labor, practical, and creative activity of workers is decreasing and the quality of manpower is deteriorating.

Thus, among the basic reasons, for which scientific and technical progress is slowing down, one should name, first, the failure of economic practice to claim a significant amount of developments and the accumulated scientific potential and the decrease of the resources that are being channeled into the further buildup of this potential for future generations. Second, the lack of receptivity of production to what is new, including due to the imperfect economic mechanism and the nonprogressive economic strategy of scientific and technical progress. Third, the shortcomings in the system of the management of scientific and technical progress, when scientific and technical policy, as before, is as if autonomous from socioeconomic policy.

Now the USSR State Committee for Science and Technology jointly with the USSR Academy of Sciences is working on the draft of a concept of the management of scientific and technical progress. The concept contains an evaluation of the state of scientific and technical progress at the present stage, the main tasks of scientific and technical progress for the 13th Five-Year Plan and the period to 2010, and suggestions on the improvement of scientific and technical policy and the economic mechanism.

Under the conditions of democratization the role of forecasts is increasing sharply. The value of forecasting for the competent management of the national economy is becoming no less important than the plan under the conditions of strictly centralized management. We have been dealing with forecasts for many years now, but have been treating them, in essence, lightly. While the United States, the FRG, and Japan are formulating very precise forecasts of the development of scientific and technical progress. They exist not only in words, but also in drawings, posters and calculations, and even in a real design. For example, a motor vehicle of 2000 is already being tested today on roads. Unfortunately, such a practice is completely lacking in our country.

When restructuring the economic mechanism of the management of scientific and technical progress the work on the objective estimation of the needs and possibilities of science should be stepped up. It is necessary to talk not only about the fact that production is not receptive to what is new, but also about why it is not receptive to new scientific results and where the objective difficulties lie. How, for example, must one gradually strive for the improvement of industrial complexes?

The formulation of a comprehensive long-range forecast with the extensive use of competitive principles and public discussion is necessary. Thus far there is practically no public discussion in our country of major scientific themes, scientific projects, or technical solutions.

How does the matter stand in practice? A short scientific article, the publication of which changes hardly anything in our life, undergoes discussion at least seven or nine times. The scientific supervisor looks it over, an expert commission deals with it, they discuss it in the editorial board, and they send it to a secret "black" opponent. All the members of the editorial board look the article over before it is published. Finally, the editor in chief also looks

through everything before publication. The fate of major projects, on which we spend billions, is decided in an exclusive manner in the department itself, in the organization which is carrying out this project.

The questions of competition and the attraction to them of the leading scientific forces of our country have not been settled. This work is of primarily a public nature, they have not given it a state status.

The correct choice of the priorities of scientific and technical progress is also important. We have done much work on this, a number of state and academic programs have been developed. Priorities, of course, should be oriented to ultimate goals. For example, the program "New Materials" should answer the question: In the name of what are these new materials being developed? The programs should ensure the meeting of social needs, create new working and living conditions, and help to solve the problems of food and consumer goods production, the increase of the life expectancy of people, and the decrease of child mortality and the death rate from the most widespread diseases. This is also the meeting of the needs for housing, recreation, spiritual development, and, finally, information supply and the level of education. This is also the solution of the problems of transportation, the radical improvement of the use of natural resources, the commitment to the turnover of new sources of energy, and informatization, the development of which can lead to radical transformations in physical production and in the social and spiritual spheres.

The accomplishment of the main tasks of scientific and technical progress on the change of the character of production and the improvement of the quality of life of people should be carried out gradually. We must not imagine that, having woke up one morning, we will find the desired changes, which have occurred by themselves.

Therefore, along with the solution of immediate problems it is necessary to develop long-range research and development in the priority directions. Among them are the production of foodstuffs on the basis of the extensive use of biotechnology, the informatization of society and the automation of production, new functional and construction materials, ecologically clean, qualitatively new sources of energy, and the use of superconductivity.

In order to manage by stages and efficiently the realization of the priority directions, the adoption of decisions on the indicated questions by the USSR Supreme Soviet on the representation of the USSR Council of Ministers seems expedient, while providing in so doing for the appropriate centralized resource supply and organizational support. The implementation of scientific and technical policy within the priority directions of scientific and technical progress should be carried out by operating organs of state administration, but with a fundamental change of their functions. The creation of the organizational, economic, legal, and management conditions of the development of new technological structures of social production in the priority directions should become their main task, it is necessary to relieve them of responsibility for the daily activity of industry.

The ultimate goals of programs in the priority directions will be realized through projects, which are selected on a competitive basis with the enlistment of the best forces of the country and with the creation of special conditions for the work of experts. The expert examination should become the basis of the policy of scientific and technical progress.

It is intended to have the scientific supervision of a program carried out by a scientific council, the chairman of which should be approved by the USSR Council of Ministers, like the general designers for especially critical directions of aerospace engineering are approved.

The flexible combination of centralized and decentralized methods of management should be a necessary condition of the successful performance of work in the priority directions of scientific and technical progress under the conditions of the radical economic reform. The centralized influence should be focused on the implementation of the most important measures and programs and be realized by means of state support—by financing from the state budget, by the allocation of centrally distributed resources, by means of the state order, and by the granting of various privileges. It is intended to realize decentralized, indirect influence on the basis of the extensive use of economic levers, stimuli, and tax methods. Along with the use of privileges various kinds of sanctions should be envisaged for the failure to meet the conditions and requirements in the implementation of programs and for the violation of technological discipline. Moreover, for the cutting back of obsolete, ecologically dangerous works it is intended to systematically restrict the production volumes of such a product and to introduce a system of penalties and additional taxation.

The internal assets of enterprises and organizations, bank credits, as well as state budget appropriations, which are allocated, as a rule, on a proportionate basis to the performers of the programs and the consumers, should be the sources of financing of programs in the priority directions of scientific and technical progress.

It is also necessary to make the priority directions of scientific and technical progress the basis for the development of international scientific and technical relations for the improvement of the structure of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries.

To support the proposed mechanism of the realization of the priority directions, it is necessary to implement a number of steps that are of importance for scientific and technical progress as a whole. This is the development of a system of the legal support of scientific and technical progress, including the questions of the interaction of organs of state administration, legislative authorities, and the public. It is necessary to pass, in particular, a law on intellectual property and inventive activity and to introduce antimonopoly legislation.

For the purpose of creating the conditions for the receptivity of enterprises to scientific and technical progress the utmost development of market relations should be ensured. This should create stimuli for the increase of the efficiency of production and its constant modernization. It is necessary to implement a set of steps which include financial and credit, tax, price, and economic organizational levers of stimulation.

The changeover of scientific organizations to the new conditions of management is the basic direction of all the work on the improvement of the economic methods of managing innovative activity. This is first of all cost accounting. The new system of financing, including at institutes of the Academy of Sciences, in a number of cases is not yielding, however, an increase of the quality of scientific research and efficiency, but often leads to a simple increase of the wage. It is necessary to approach in a new way the use of new advanced economic forms of the cooperation of scientific and technical activity and production economic activity in the direction of the establishment and development of associations of partners and other forms of joint enterprise and the activity of scientific technical complexes. Interbranch scientific technical complexes in many cases have justified the concept that existed when they were being established, there are many interesting results. But assistance should be given to approximately one-third of the complexes. Finally, there is approximately another third of the complexes, which organizationally, apparently, were conceived not very successfully. In the new statute on the interbranch scientific technical complex, which, unfortunately, has been under consideration for a long time in the staff of the USSR Council of Ministers, it is necessary to specify clearly the composition of the complexes and the advantages and privileges, which are granted to those who fill state orders of intersectorial importance, as well as to provide guarantees on their resource supply. This is one of the central issues.

The use of conversion is a most important factor of the improvement of the management of scientific and technical progress. Well-organized information about the possibilities of scientific research institutes and design bureaus of the military industry for our civilian scientific research institutes and design bureaus and about the available instruments, stands, and so forth is necessary for the effective enlistment of the scientific potential of the military industry in the solution of national economic problems. In the conversion program, which has now been prepared by the USSR State Planning Committee, it is necessary to specify the priority jobs, the introduction of which makes it possible to obtain an economic impact in a short time.

The improvement of the management of scientific and technical progress also presumes the development of a new approach to questions of international scientific and technical cooperation. This pertains to scientific and technical cooperation with both socialist and capitalist countries. Alas, for the present this system is far from the ideal. The results, which are obtained by us after participation in congresses and conferences and after practical studies, do not go farther than the laboratory, from which one or another scientist or specialist went abroad. Here it is necessary to change the state of affairs radically. It is also necessary to place international scientific and technical cooperation on a cost accounting basis. It is necessary to pay for scientific achievements, ideas, material, and raw materials. It is advisable to organize annual trade fair sales and to invite representatives from socialist and capitalist states.

The basic emphasis in the formed situation should be placed on the development of direct ties among partners. With allowance made for the restructuring processes in the political and economic spheres in the CEMA member countries it is desirable in the shortest time to update the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries and to restructure the mechanism of its implementation.

When offering a product to the international market, it is also necessary to think about how to offer new knowledge as a commodity product. Soviet science can become one of the important sources of the influx into the country of foreign capital for the establishment of joint scientific centers of development, if we work on these questions more actively and boldly. We have thus far not learned to sell our licenses, scientific works, and ideas.

The level of training of personnel is acquiring great importance. It is necessary to change the set system of higher educational institutions, which does not have sufficient flexibility and does not ensure the training of specialists in fundamentally new priority directions. Our chairs were established long ago and in the traditional way. No one ever revises these specialties and programs in essence. We keep undergraduates 5 years in the silence of VUZ laboratories, they work on primitive equipment, but after the higher educational institution they get to a modern works, which literally sets upon them with all its problems, and the graduates of the higher educational institution are forced to learn all over again.

It is necessary to make our leading civilian industrial enterprises the base organizations for educational institutes and to give undergraduates starting with the 3rd year a program of the preparation of course projects and the possibility of work on a specialty directly in accordance with the tasks of scientific research institutes, design bureaus, and plants.

Another question is the conferring of the academic degrees of candidates and doctors of sciences. A new approach is also required here. Why should a degree seeker not sleep nights and think about what the opponent will say to the scientific council, public opinion, and the author himself? Why does his fate lie under the secret bedspread of this opponent and this dramatic name—"VAK" [Higher Certification Commission]? Yes, such a state commission is probably needed. It should monitor the work of the councils, but it is also necessary to have faith in them. Today

the procedure of conferring academic degrees is a lengthy, complex one, is delayed for months and at times for years, and does not justify itself.

The essence of a scientific education consists in the combination of the necessary minimum of basic knowledge with a new intensive methodology of research. Specific information, which quickly becomes obsolete, can be concentrated in constantly updated knowledge banks, but base, fundamental knowledge should be the basis. In this connection it is necessary to revise the work of both the Academy of Sciences and the higher school on the preparation of books, textbooks, and monographs and on the training of personnel of the highest skills. In the new directions there are no good textbooks either in the school or at the higher educational institution or for graduate students at the Academy of Sciences. There are many problems here. First of all it is necessary to name the low royalties for the preparation of a good textbook or book. There should also be a clear program of the preparation of specialized teaching aids.

The conferring of academic titles and degrees is not for a result, an instrument, a design, and introduction, but for the number of published pages, including those which are not read by anyone. Undergraduates pass examinations on the basis of summaries, while textbooks are presented by the authors to each other as a "lofty" scientific work. Serious planning work should be performed here in order to provide specialists with the needed knowledge.

And our engineering corps? Many monographs have been published, but for the designer and the process engineer in production there is no information that reflects the achievements of modern science. The Academy of Sciences is now developing an encyclopedia on machine building. But there are, however, many other directions that require generalization. In practice only doctoral dissertations are published as monographs. Good, absorbing, illustrated books, which popularize science and develop the creative thinking and intellectual curiosity of children and youth, in practice are also not published.

It is necessary in general to raise the public prestige, which has declined appreciably in the past decade, and the social and material status of scientific personnel. When young people cease to be interested in science, this is frightening. This kind of critical point has appeared today: there is no competition for graduate studies, the competition for higher educational institutions has decreased, there is no desire for the defense of a dissertation. Over the last 30 years a decrease of the level of income of the people, who are engaged in mental labor, has been observed everywhere. The sphere of science, where professional activity is impossible without modest, but sure comfort, experienced an especially strong adverse influence. The scientific associate, after all, often should also work at home.

The introduction of the new system of the remuneration of labor at scientific institutions led primarily to the increase of the wage at planning organizations. The bonuses increased by tens of fold, but the quality of plans did not increase, because there is no competition there.

In speaking about the improvement of the management of scientific and technical progress, it is also necessary to mention the redistribution of functions between the center and the regions, between legislative and executive bodies, between the state machinery of administration and public self-administration.

It is necessary to place the new technical policy on a legal basis. Antimonopoly legislation, which eliminates the dictation of the producer over the consumer in the sphere of scientific and technical activity, should be passed. On the basis of the increase of the influence of the state on structure-forming factors it is also necessary to bear in mind the methods of regulating the market economy as it develops. Among them are the use of taxes, subsidies, the concentration of resources and the efforts of performers on the priority directions of science and technology, and the reduction of superfluous economic activity on formal gross indicators. Finally, the development and improvement of the criteria of the evaluation of the technical level.

Many of the questions raised here still require their discussion and the development of mechanisms of the implementation of some recommendations or others. But all these questions of the improvement of the management of scientific and technical progress are connected with the fate of the economy and progress of the country.

[No 42, Oct 89, pp 15-16]

[Text] How is one to shorten the path of a scientific idea from the conception of a researcher and the drawing of a designer to machines, computers, and machine tools that operate in the national economy? Have talented engineers and designers not disappeared in our country? What is paralyzing their thinking and binding their hands? And why is the lag behind the leaders of scientific and technical progress in other countries increasing? Continuing the publication of the notes from the meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy, which were begun in No 41, we invite the readers to express their opinion on the raised questions, to participate in the active discussion of the problems of the acceleration of scientific and technical progress in our country, and to tell how they are being solved in life.

The Concerns of a Designer

The labor of a designer begins the process of developing new equipment. Why is equipment, which lags behind world achievements, is not efficient enough, and does not answer the requirements of consumers, being developed? These questions were examined in the statement of P. Amelchenko, general designer for universal row-crop tractors of the USSR Ministry of Agricultural and Tractor Machine Building.

The regular modernization of products, which are in production, and the scientifically and economically substantiated development of machines for the immediate and distant future, he noted, are needed for the constant maintenance of such a complex machine as a modern tractor at a high technical level. The availability of physical

assets and production capacities for the prompt assimilation of modernized and new machines is necessary. However, we do not have accurate forecasts of the direction of development of tractor equipment. Therefore, considerable forces and assets are often spent in vain. The protracted selection of a promising model of a universal row-crop tractor, which held up its introduction in production, can serve as an example of this.

A sore subject is components. Today they make up approximately 50 percent in cost terms, there are from 1,000 to 1,700 such parts per tractor. Related enterprises are not interested in the leading development of items and materials of a higher quality, since for the most part they are monopolists and know that the client does not have a choice.

Experimental design work is financed according to the remainder principle, although it determines the future. The basic tractor building firms abroad use for design and research work about 5 percent of the profit, while the plants of our sector use about 1 percent.

There are no idle capacities for the preparation of production. Today, for example, at the Minsk Tractor Plant there are tens of new technical solutions, which have been lying about for years and are not being introduced. There is a reserve of new tractors, and they are also not undergoing operational development due to the lack of idle production capacities and a shop of small series, where it would be possible to develop new equipment and export products.

Regular deductions of earned currency for retooling can become one of the sources of the development of the engineering service. It is necessary for design organizations to have their own assets, which they could dispose of and with which they could buy models of the latest equipment and other machinery.

On a Joint Stock Basis

The new forms of economic activity, which have emerged during the economic reform, have broadened the possibilities of the practical assimilation of innovations of science and technology. The advanced organizational economic structures should blend fundamentally with the new economic mechanism, which thus far they have not always succeeded in doing. M. Aleksandrov, general director of the Nauchnyye pribory Interbranch Scientific Technical Complex of the USSR Academy of Sciences, spoke at the meeting about the problems arising here. He pointed out the serious growing lag in many decisive areas of new equipment, first of all in high technologies. Here the gap is so large that their pulling up by the traditional steps of state foreign currency injections is a preposterously expensive, protracted, and unconstructive matter. Moreover, no matter what political decisions are made at any level, major firms of the West are not making any compromises in deliveries of the latest equipment and technologies to the Soviet Union. And here we are in a certain sense unequal partners. The establishment in our country of joint ventures with the participation of foreign capital should aid the solution of this problem. Our association, M. Aleksandrov said, has organized them with the largest firms of the West—the United States, the FRG, Switzerland, and England. And this is yielding its results.

However, today there are already not enough joint ventures. It is necessary to develop a base mechanism, which is comprehensible to western firms, for the attraction of foreign capital. Here it is possible to use the potentials of joint ventures on a joint stock basis. But, of course, it is necessary that the combining of the new forms of management with the structures existing in the socialist economy, for example, the system of material and technical supply, would occur. The new economic formations should not, apparently, be removed from the system of state regulation. State organs can even act as founding stockholders with the corresponding rights in management and the receipt of income. It is a question of the development of new forms of state or state-cooperative, mixed ownership on a joint stock basis.

Thus, proposals on the establishment of an international joint stock association in the area of instrument making, automation, and microelectronics have already been prepared. Major western firms and banks have agreed to finance it.

A law on joint stock companies in the USSR, which should create a clear legal basis of their activity, without restricting it at the same time to a rigid framework, is now being prepared. It is impossible, for example, to form identical joint stock associations in the machine tool building industry, in microelectronics, or in instrument making.

At the same time the oversimplified notion that it is sufficient to have a certain miracle-working economic mechanism, which stimulates the activity of workers and scientists, and scientific and technical progress will speed up by itself, has become firmly established. It is necessary to bear in mind that the main thing is the initiative of people and the legal opportunity to work on some problems or others. Enterprises themselves are capable of modifying the general model of the economic mechanism, with allowance made for the specific conditions of their activity.

How Are Economic Levers to Be Used?

The use of economic levers for the acceleration of scientific and technical progress, in the opinion of Yu. Skokov, chairman of the board of the Kvantemp Interbranch State Association, will bring success, provided the peculiarities of the crisis in the economy, inflationary processes, and the tasks of the improvement of finances and the balance of the commodity-money mass and the switching in the future to freely convertible currency are also taken into account. Scientific and technical progress should help to unite the money of the population and enterprises, to obtain capital, and to convert the ruble. The task of self-financing should be accomplished in deed, but this is possible only on the basis of scientific and technical progress.

Unfortunately, the increase of the profit at present for many people is identified only with the increase of contract

prices. A scientifically substantiated procedure of the formation of the profit is ensured by the increase of labor productivity, which is achievable first of all as a result of scientific and technical progress. However, the saving of material and labor expenditures and natural resources has thus far not become an internal need of the enterprise. The solution of these problems is encountering both organizational and economic difficulties. Major results here require new technology, equipment, raw materials, new types of materials, the organization of modern production, and the use of qualitatively new construction possibilities. But at present this entire chain is economically disconnected. And the primary thing is that we do not know how to sell and buy scientific research, experimental design, and technological works and even to prepare them for sale.

The analysis of the causes of the irregularities in the implementation of the achievements of scientific and technical progress leads to the conclusion that truly economic methods of the management of scientific and technical progress are practically absent. The enterprises, which produce means of production and extract raw materials, require large expenditures, but they have very limited possibilities for increasing the profit. They are forced under the new conditions of management to increase the price without the proper grounds for this and are not providing the advanced means of production, which the consumer needs, either with respect to quality or with respect to quantity. For the present there is no market of means of production and no market of materials, it is impossible to talk about the expansion of the consumer goods market, just as about the development of scientific and technical progress.

Contract prices predetermine the sale and preparation for sale of only scientific and technical solutions that are comprehensible to consumers. No one wants to take something unknown. Thereby we are severing the future and are severing basic science.

The method of financing scientific research and design work also inadequately stimulates a high end result. The managers of enterprises and projects scurry somewhere and extort money only in order to provide the staff of workers with the necessary amount of work and a wage fund, but do not aim at all for the end result. Scientific and technical progress for the present is being spread by directive, in the form of the percent of the updating of products, which is issued by the State Planning Committee. The new methods of management are being changed too often and inexplicably, which is creating among managers and in collectives nervousness and a lack of confidence in general in the planning of actions and deeds.

How are these problems to be solved? First of all it seems necessary to change the procedure of financing science and to give it working capital. Instead of this, development funds have to be diverted or money has to be transferred to science from somewhere. The use of credit for these purposes is limited.

It is also necessary to change the indicators of planning. Thus, a relative indicator, which is calculated as the rate of decrease of the production cost, is advisable for resource conservation. It should be at least equal to one. It is also possible to use ratios of indicators. The indicator of the yield on capital, which previously was never dealt with, is also necessary.

At the Kvantemp Association, while analyzing the structure of the profit when drafting the plan for 1990, we clearly specified for enterprises these indicators, which are forcing them to turn to the achievements of scientific and technical progress.

Among the proposals, which were advanced by Yu. Skokov, it is also necessary to name the possibility of the "sale" of indicators, which will give the right to form the remuneration fund and the indicators of productivity and the profit subject to realization of the final product even to those collectives that produce the intermediate product which is needed for it. For whoever produces, say, means of production, today cannot depend only on his own products. These products are labor-consuming and metal-consuming, do not yield a profit or yield not enough of a profit. Hence, whoever produces the final product, should share the profit and the turnover tax in accordance with the end result with whoever is involved in cooperation in the production of this product. Within the Kvantemp Association such a system has been introduced. It is possible, as experience showed, to change drastically the situation and the attitude toward scientific and technical progress just by the redistribution of the profit in accordance with the end result and by the "sale" of indicators.

When developing the new economic mechanism, one must not jump immediately from the first phase to the fourth, as they often attempt to do. It is necessary to construct a staircase, to take specific steps, to learn how to move over this staircase, but not to point to the fourth phase and say: be there tomorrow. In place of administrative command methods, in the opinion of Yu. Skokov, an economic command mechanism, which will make it possible under the conditions of the transition period to arrive at a new character of the economy and to avoid anarchy, should be proposed today. Economic command methods signify the regulation of the economy, for example, by means of interest rates for the use of credit, which are differentiated subject to the activity of the enterprise, and the checking of resources for the financing of various types of activity.

Among the economic levers of the management of scientific and technical progress it is necessary first of all to name the affording of the opportunity and the simplification of the procedure of the independent selection of any partners for the performance of scientific research and experimental design work. For these purposes they should have the opportunity to obtain with subsequent mutual settlements credit resources for the financing of joint scientific and technical programs. It is necessary to establish the recommended proportions between individual stages of the development of new equipment, for example, between scientific research work and experimental design work. Thus, the analysis of statistical data testifies that in

the world there should be three designers and five process engineers per researcher. At Soviet organizations there are 1 process engineer and 2 designers per 10 researchers. How is one to arrive at the optimum ratio? Best of all, Yu. Skokov believes, through the procedure of the financing of each type of activity. Thus, at the association they established a 10-percent risk fund for basic research. In all 20-30 percent is being channeled into experimental design work, but this work should be financed through credit with subsequent repayment by means of the redistribution of the profit in accordance with the end result. A joint stock commercial bank, which is helping to implement this arrangement, has been established. The organization of the bank made it possible to approach in a completely new way the management of scientific and technical progress. In particular, to use factoring operations in case of the purchase of products, when the buyers are not creditworthy. The bank repurchases the product, then collects the money from the buyer. The bank, for example, recommends to enterprises that they introduce an innovation, but if the enterprise refuses, a rigid interest policy with respect to credit is applied to it. Such a system makes it possible to command activity, but to command by economic methods. Therefore, at the association it is customary to talk about economic command methods.

The monitoring of the yield on capital of scientific research and experimental design work is also very important. Back when preparing the plan for 1990 at the association they rejected the planning of the rate of the updating of products of 11 percent, which was established by the USSR State Planning Committee, and established for each scientific subdivision, which is engaged in a specific job, a yield on capital of 2 rubles 85 kopecks per ruble of invested capital. The subdivision should prepare and introduce together with production workers qualitatively new products worth precisely this amount. Calculations showed that the rate of updating in case of such an approach came to 19 percent.

The introduction of cost accounting relations throughout the system of the management of scientific and technical progress, of course, is necessary. One must not distribute financial, material, and manpower resources from above, it is necessary that the cost accounting partners, who are interested in their efficient use, would act. Timely information supply is also important for the developers and users of scientific products. Today both production workers and scientists often do not know who is capable of what in the development of new equipment, who can do what, who has what, and with whom it is possible to enter into contacts.

The problem of the formation of the market is acquiring particular importance. The market for the present is not saturated, demand leads supply, no one is about to fight for the consumer. The usual explanations for this are the monopolism of producers and ministries and the lack of competition. But is this so? How many enterprises, for example, produce refrigerators, but there are no refrigerators. No one is fighting for the market. But how many produce televisions? No fight for the consumer is also being observed. And it is possible to cite many such examples. Therefore, it is necessary to develop a mechanism of the formation of a real market. Both the market and scientific and technical progress are closely interconnected. Like scientific and technical progress, a market can appear only in case of the economic method of its formation, which it is necessary to do purposefully while managing this process.

In particular, it is also necessary to specify the indicators of the production volumes of consumer goods for the supplier of the raw materials that are used when producing the goods. It is possible to give a portion of the amortization deductions to the producers of means of production for consumer goods on the condition that they will replace equipment in the set time and will begin to supply spare parts without interruption. And to plan for the end producer of consumer goods their output in physical terms and to subtract from the cost volume both the cost of raw materials and these amortization assets. Such a "sale of indicators" will also be able to interest all those participating in the production of consumer goods.

The association organized cooperation on such a basis with enterprises of nonferrous metallurgy. While previously neither the state order nor other coercive forms of influence helped.

The interbranch state association is, as Yu. Skokov believes, such an organizational form which conforms most to the stated principles. Joint scientific and technical programs, for the implementation of which credits are often necessary, should be formulated here. The management of the sectorial association is based on purely economic principles and is carried out by cost accounting firms. Its board formulates only strategy. Direct ties are outside the influence of the board: the enterprises come to an agreement with each other and with the firms that supply them. The formation of internal commodity-money relations is based on the "selling off" of indicators. All this ensures the equal rights and equal opportunities of each participant in the scientific, technical, and production process.

It is possible to use the interbranch association today as a model in the development of advanced principles of the management of scientific and technical progress. But the basic problem is still the problem of personnel in the broadest understanding of this word. A system of the search for talented people and the creation of the conditions for the display of their abilities should be established.

Basic Science for Production

Academician V. Trefilov, general director of the Poroshkovaya metallurgiya Interbranch Scientific Technical Complex of the Ukrainian SSR Academy of Sciences, devoted his statement to the questions of the quickest advance of scientific ideas into production, the development of the latest technological solutions, and the strengthening of the contacts between basic science and production. A complex chain, all the elements of which are important, is emerging in this direction. It is sufficient to break this chain somewhere between basic science and production, and the

entire innovation process will slow down immediately. Do we know how to keep the links of this chain in sight? No, we do not yet know. There are links which have been inadequately developed. But at the same time there are also examples, when attention to the entire chain actually led to the very rapid and efficient advance of the results of science into production.

The present chain "in the standard version" in our country in the overwhelming majority of cases takes up 9-15 years. The American and Japanese press use the figures of 3-6-9 years. And if we preserve this situation, we will see only the receding, so to speak, red taillights of our rivals. At the same time systems, which ensure a high speed of the advancement and solution of scientific and technical problems, have formed in the country. These are the Novosibirsk and Ukrainian systems. In the Ukraine scientific and technical developments advance into production in 0.5-3 years.

The entire world, responding to the vital questions of the scientific and technical revolution and the most fierce competition in this area, has adopted the system of work on priorities. Many speakers at the meeting also supported such a direction. However, there is one area, in which it is necessary to be cautious with priorities—this is basic research. Of course, it should also be oriented toward specific goals. But it is always necessary to leave a reserve for free inquiry, let us assume, 30-40 percent. It is impossible to have a firm knowledge of precisely where the sought result will pop up.

The question of the optimum use of assets for the financing of science is also vital. These assets do not yet always get to the centers, which today determine the character of Soviet science, although they are located not in Moscow. Therefore, when it comes to financing basic research, it is necessary to look less at the uniform of the organization and to consider more its effectiveness.

The formation of a system of state priorities is especially necessary for applied research. Is it possible, for example, to link the entire future and present of our power engineering only with nuclear power plants? On the initiative of the Ukrainian SSR Academy of Sciences an alternative version of the development of power engineering was submitted to the republic government. It is shown in it that it is possible to manage without the construction of new nuclear plants, having placed the emphasis on the development of gas power engineering. The situation in the country in this respect is unique, we have enormous gas reserves. But it is necessary to perform an entire set of operations in order to implement such a direction in practice.

In the Ukraine these problems are especially urgent, there are a high degree of economic development of the territory and an enormous population density here. But will the version of the development of power engineering of the country with reliance on gas, perhaps, actually be a reasonable solution for the entire European part of the Union? Moreover, a "gas pause" of 10-12 years will make it possible to develop a new generation of atomic reactors and to return to nuclear power engineering on a new basis.

Practical experience shows that the work on goal programs is not proceeding efficiently enough. Let us, take, for example, the program on the development of the production of ceramic materials. Ceramic items are needed everywhere, the scale of the problem and the scale of the economic gain are enormous. Advanced ceramics are making it possible to develop engines of new generations. The power of the internal combustion engines, which are being used today, is 9 billion kilowatts. Ceramic experts say that it is possible to increase the efficiency of an engine by 20-30 percent.

This means that given the same amount of fuel it is possible to obtain more power than at all the electric power plants of the world. Ceramics are a new element base of radio electronics with fantastic possibilities, high temperature superconductivity, new power storage cells, which store more power than explosives, and a large number of other latest solutions in medicine, the defense industry, and other spheres of application.

But how has the work on the program on the development of ceramics gone? Fulfilling the 1982 decision, the USSR Academy of Sciences prepared a state program, which circulated among our governmental instances for 6 years. As one of the supervisors of this work, V. Trefilov has to go through more than 30 ministers on 3 occasions with the obtaining of official stamps. In the summer of last year this program was reported to the government and was approved, but by the beginning of September of this year had not been signed. While the Japanese firm Nisai Motors is beginning the production of ceramic motor vehicle engines in 1990. In the complex science-production chain the time factor is most important. And if we undertake something in science and decide to do something, hence, it is necessary to fulfill what has been planned punctually. Great internal discipline and work efficiency are needed.

The establishment of interbranch scientific technical complexes is making it possible to bring a scientific and technical result quickly to a logical finale—a technology, a new unit, new instruments, which have been introduced in production. In the system of the Ukrainian Academy of Sciences work in this direction has been performed for a long time now. Design bureaus, pilot plants, computer centers, data banks—the entire infrastructure, which makes it possible to put the finishing touches on a scientific idea—have been established. Thus, the Institute imeni O.Ye. Paton has an experimental plant and two of its own design bureaus. The Poroshkovaya metallurgiya Interbranch Scientific Technical Complex has the institute of problems of material science, two design bureaus, and its own plants in Kiev, Makeyevka, and Chernovtsy and is building an enormous plant near Kiev. The first data bank on materials in the Union has been accumulated. As a result new sectors of industry and fields of knowledge, such as powder metallurgy, ceramic material science, and ceramic materials, have appeared.

This experience testifies that the mandatory bringing of a scientific idea up to such a level, when workers of industry could say: we are introducing it or are not, is vitally important for its fate. For at times scientists draw diagrams for the director of a plant and the chief engineer and show beautiful illustrations. The director or chief designer, whose head is crammed with a million of his own problems, sits in front of them and nods very politely. But the idea has not been analyzed, one has to wait a long time for the result. The conversation is completely different, when scientists have brought the new items themselves: the parameters are clearly visible, it is clear on what and where the spurt ahead was made, when it is possible to say that an order for the production of some number of the new items, which it is then possible to check and to advance into production, is accepted.

Such contact with production is helping to assimilate new items in the shortest time, to compete with the West, and to win the competition with the best foreign firms.

The mandatory pilot enterprise, works, plant, and shop are a most important element of this entire system. World experience also testifies to this. In the United States, for example, 650,000 new firms appear annually—these are little guys, market scouts, and venture firms, many of which are ruined. There remain 50,000-60,000, but such small business provides a mobile, efficient, and quick analysis of both the domestic and the international market. And wherever an outlet and consumer recognition emerge, an effective new direction of the development of industry appears.

We have precisely here the narrow link in the assimilation of the achievements of scientific and technical progress. It is necessary to give scientific personnel production areas, machinery, and equipment at the proper time, in order to check their ideas and to make the needed prototypes. But this often does not happen. The USSR Ministry of the Machine Tool and Tool Building Industry, for example, for a year has not be able to allocate two presses for a new technology of the unique production of diamonds. It is impossible to work that way, for what was the purpose of hounding researchers and hurrying at subsequent stages? It is necessary to establish a system which would provide this vitally important stage of the development of a new product with the necessary material and technical supply and the necessary assets. These are crumbs, which are very small on the scale of the country, but without them nothing will come of it and the entire scientific and technical melody will not begin to play.

And there is another problem. Science cannot live without talented people. Well-known scientist P. Kapitsa said that for the Presidium of the Academy of Sciences the search for and support of talented people should be a more important matter than concerns about themes and the establishment of new institutes. Science is such an area, in which people do everything, it is necessary to seek talented people. Talented people—these are generally recognized truths—are very vulnerable, are not impudent, are not rude, and will not elbow their way. A very considerate attitude toward them is actually needed, it is necessary to seek and support talented people.

The development of science and new technology, the introduction of scientific and technical results, and scientific and technical progress itself are impossible today without an information system. We have fallen very far behind here. The entire world lives today by means of powerful information systems which cost enormous amounts of money. In our country there are several enterprising collectives which have developed such systems, but they simply cannot gain themselves the status of state systems. There is also the information transmission system, which was introduced in the CEMA countries at the highest advanced hardware level. But we practically cannot use it and have not created the banks of needed data. It is necessary to correct the situation immediately.

Where Is the Prospect?

Yu. Kosyak, general designer for turbines for nuclear power plants, on the basis of the example of the Kharkovskiy turbinnyy zavod Association showed how important it is for a collective of 10,000 to organize its own both current and long-range work on the basis of a precise program of the development of one scientific and technical direction or another. The plant is engaged in atomic turbine building and produces gas turbines and transport gas turbines. In all 1,000 designers and researchers work in the collective. The design subdivision undertook to perform the finishing operations in the production of turbines.

For such a large skilled collective it is important to have a precise plan of work. But what is happening? Due to the criticism of atomic power engineering they removed from the plan for 1990 without any preparation the production of three 1 million kilowatt turbines. But cooperative relations has been established, the blanks are being forged. Each machine weighs 6,000 tons. And what about the plan for the 13th Five-Year Plan? Previously it was agreed to produce sixfold more 1 million kilowatt turbines. Given such instability, about what technical progress is it possible to speak? It is necessary to have at all levels a precise program in the most important directions.

The collective is prepared to expand the work on gas turbine themes. This is the only enterprise in the country, which produced steam and gas plants and gas turbines of a modern level. But here, too, the prospects are unclear.

For the settlement of many questions of the technical modernization of production and the increase of the wage of designers it is also necessary to examine the conditions of the formation of the fund of the remuneration of labor, the payment of bonuses, and pricing. If the association operated as a cooperative and had the right to sell products at contract prices, the profit would also be higher. It is more profitable for cooperatives to work at contract prices than for state enterprises to work at stable prices. That is why the profit tax, which envisages both a progression with the increase of revenues and certain privileges subject to the directions of their use, is so important.

[No 43, Oct 89 pp 15-16]

[Report by A. Matveyev on meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy under the rubric "Scientific and Technical Progress: Points of Growth": "The Direction of a Breakthrough. Notes From the Meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy"; third in an unspecified number of installments; first paragraph is EKONOMICHESKAYA GAZETA introduction]

[Text] How is one to overcome in the shortest time the technical lag of our enterprises behind the best foreign firms? What is it necessary to do in order to ensure a breakthrough in the priority directions of the development of scientific and technical progress? How is one to raise the prestige of engineering labor and to attract the most talented scientists to scientific and technical research? Continuing the publication of notes from the meeting of the Commission of the CPSU Central Committee for Questions of Socioeconomic Policy (EKONOMICHESKAYA GAZETA, Nos 41 and 42), the editorial board presents the point of view of the conference participants on these questions. And what do our readers think?

"The Laser Beam Policy"

"It would be strange if we, while recognizing the crisis of the economy as a whole, did not notice the serious crisis, in which our science and technology have been for many years. This pertains both to basic science and to applied development," Yu. Yakovets, head of a chair of the Academy of the National Economy attached to the USSR Council of Ministers, noted.

Now, for example, ten twenty-firsts as many new models of equipment are produced on the average in a year than in the early 1960's. Their technical level is very low. The share of our country in the past 5 years in the world published collection of inventions has decreased by nearly a half, while in several most important directions it has decreased even more. And this is in spite of the fact that the curve of expenditures on science is ascending.

If we take the number of innovations, there are enough of them—three-fourths of a million for industry alone. But if we take a straight look, only 24,000 innovations are introduced in a year. Moreover, the majority of them are insignificant ones, which improve obsolete equipment. A revolutionary breakthrough is not visible, there are extremely few base developments. And in technical level the overwhelming majority of new items are all the same a modification of an old generation of equipment.

There is also nothing surprising in the fact that our enormous production apparatus is inordinately swollen. In its present state it simply cannot produce qualitatively new equipment with the corresponding technical and economic parameters. As a consequence, the rate of our lag is increasing very rapidly. We already lag in the output of high technology products even behind South Korea and Singapore. This is similar to the crisis, which to some extent in a milder form occurred in western countries in the later 1970's and early 1980's and became an objective transition to a new technological structure. But there they succeeded in overcoming it and in making a breakthrough in a large number of directions. In our country, unfortunately, everything was terribly dragged out. And if we do not change the state of affairs and do not develop a truly revolutionary strategy and a mechanism of its implementation, this is fraught with extremely serious consequences.

What are the elements of the anticrisis strategy? In the opinion of the speaker, the first element consists in the fact that it is necessary to turn scientific and technical progress very sharply toward the people. For 75 percent of the state allocations for science go to the military sector. While heavy industry, machine building, and other sectors, which produce means of production, appropriate the lion's share of the remaining 25 percent, and very little remains for the sectors that produce consumer goods.

Of the 14 state programs for the next five-year plan only 4 are linked somehow with man—2 basic programs and 2 applied programs. How many years now there has been talk about that fact that without a serious, in-depth program on the saturation of the demand for household electronics the country will not be able to settle the very many questions of the market and the transition to more economical housekeeping, in which for the present vast resources are being lost. But the matter is not making headway. True, now the hope for changes has appeared, because the idea of conversion consists in the fact that a portion of our best intellectual potential would be channeled into the settlement of these questions.

Consequently, the first thing necessary is the social reorientation of scientific and technical progress literally at all levels. The second thing is a differentiated orientation toward revolutionary directions in science and technology. It is a matter of real breakthroughs, on which it is possible to earn billions, provided we are able in a flexible and rapid manner, by allocating first of all centralized resources, as Japan, the United States, France, and West Germany are doing, to guarantee ourselves a breakthrough in priority areas. The Japanese call such an approach "the laser beam policy." That is, it is necessary to single out some narrow sector and with respect to it to quickly and comprehensively consolidate the positions on the domestic and world markets. This is a very serious problem. It concerns both the choice of the priority directions of scientific and technical progress and the fact that there should be some criteria of the selection and support of talented scientists. From the sea of reports and inventions it is necessary to know how from the very start to select what can yield a major impact and the most promising started scientific projects. A special fund should be established for this in a centralized manner. It is clear that some portion of the assets will not be recovered, but in science this is inevitable.

The third direction is the technological market. By it there are meant, first, the market of scientific and technical products and, second, the market of high technology. This market is distinct from others, and on it monopolism, that

is, what we are now observing very clearly in industry, where there is freedom in the establishment of prices, without adequate criteria of its substantiation, is particularly frightening and dangerous. Therefore, it is now very important to create the conditions for scientific and technical rivalry and scientific and technical contention, so that collectives could compete. The objective evaluation of their labor and a choice are needed.

The fourth thing is scientific personnel. The training of the next generation of scientists, which surpasses the present level in competence. The pace of the aging of scientific personnel has now increased sharply due to the fact that young people are leaving for production, for cooperatives, and so on. The radical solution consists in the fundamental integration of science and higher educational institutions following the example of Novosibirsk and the Moscow Higher Technical School imeni Bauman. This will afford the possibility of the constant influx and constant rotation of personnel and an interdisciplinary approach.

It is necessary to shift from an anti-innovation economic mechanism to an actively innovative mechanism. Now our economic mechanism, even the one that is being formed anew, is working against revolutionary innovations and against useful novelties.

What should the elements of the new mechanism be? First of all there is forecasting. But competitive, public forecasting, with allowance made for technical development and the succession of periodic revolutionary breakthroughs. It is also necessary to name strategic planning. Not command planning, but, perhaps, economic command planning. Programs should be comprehensive, should encompass everything, up to the saturation of the market with a specific type of product, but should not be limited only to the assimilation of new prototypes. This presumes the properly developed territorial management of scientific and technical progress. Much is now being said about territorial cost accounting. But thus far technical progress is reflected extremely poorly in regional programs. Further, the mechanism, which is being developed, should be very closely interwoven with the world mechanism. And here a shift in our foreign economic relations is necessary.

The Prestige of Personnel

In his statement Academician A. Ishlinskiy, chairman of the board of the USSR Union of Scientific and Technical Societies, dwelt on the questions of increasing the prestige of engineering labor. For in the end the implementation of scientific ideas in practice depends in many respects precisely on engineers. Now the word "engineer" somehow has gradually been lost and is not taken seriously. But precisely the engineer with his assistants—workers and technicians—creates physical assets. Engineers—active participants in the development of advanced technological processes—overcome no fewer difficulties than scientists. Therefore, it is extremely unhealthy to think that engineers as participants in scientific and technical progress are second rate, while scientists are first rate. The elimination of the shortcomings in our national economy is impossible without the implementation of engineering measures on the basis of scientific data and economic calculations.

The question of the quality of our products is now especially urgent. It is necessary that engineers together with workers would be directly interested in its drastic improvement. Only then can we sell items abroad and, consequently, obtain more currency. Now many capable specialists are leaving for cooperatives. Centers of engineering services, which are of unquestionable benefit, also exist along the lines of the Union of Scientific and Engineering Societies. However, the strategic task is, as was already said, to create all the conditions for the development of, in essence, fundamentally new technologies. And here cost accounting methods are not always effective, while at times they are simply inapplicable. Other forms and methods of work with scientists and engineers are needed here. It is impossible, say, to allocate several thousand rubles and to expect that soon some new formula will be derived or some new discovery will be made. It is necessary to agree to a sound risk and not to be afraid of spending considerable capital. And results will not be long in coming. Meanwhile we often economize on a small thing, but lose significantly more. Here at a works there is a talented, thinking engineer, he develops something new. Clearly, it is necessary to pay him more, but they do not see another solution than to make him the supervisor of a group. But he is not at all fit to be a chief. And it turns out that both he discredits himself and the work suffers. It is necessary to create for a talented engineer conditions, which in some way are similar to the working conditions and the remuneration of the labor of artists or, say, writers. How else is it now possible to commend an engineer? With an academic degree—that does not always succeed. Therefore, it is necessary to commend an engineer in some different way. And one such possibility has now already appeared, since the Union of Scientific and Engineering Societies has been established, while the federation of engineers has been established within it. It is also necessary to think about an engineering academy.

The federation assumed as the first task the conversion of the defense industry. This question is quite complicated, and without talented people the matter will not make progress.

At the same time it is necessary to interest a person not only with money and materially. It is also necessary to give serious thought to the ideological training of personnel. Many people work because they cannot but work and cannot live without creativity. And it is such people whom it is necessary to select first of all.

I. Silayev, chairman of the Bureau of the USSR Council of Ministers for Machine Building, continued the discussion of personnel.

How Is One to Train Them?

Has the time, perhaps, come to depart in principle from the goal of acquiring a higher education? Today to get a diploma is, it can be said, an end in itself. At the same time frequently a young person, who is within an institute for 5.5-6 years, often not only does not draw closer to actual

reality, but loses touch more and more with it. And a graduate, who is absolutely unprepared to actively implement his creative principles, often arrives at a works.

World practice has developed a completely different means, when an undergraduate starting already with the 1st year participates in creation and works in specific contact with his future specialty. We simply cannot force our higher educational institutes to interact with industry. Apparently, it is necessary all the same to study carefully the western model of the training of the highest technical personnel. To make our adjustments there and to begin immediately the materialization of new ideas.

For many people it was unexpected when in accordance with the results of the work during the first months under the new conditions of our scientific institutes and design bureaus the wage at them jumped unprecedentedly without a visible impact. This made it incumbent to examine the problem a little more deeply. It turned out that in machine building, in particular, prior to this year the average wage of personnel, who are involved with scientific and technical progress (scientists of sectorial scientific research institutes, designers), was 10-15 percent less than the average wage in industry as a whole. Of course, spurts in the wage without an impact are intolerable, but all the same the questions of the material interest of the engineering corps require their practical settlement.

And concerning the priority directions. Here a new approach is also needed. If, for example, one continues today to say that only the machine tool building sector will accomplish in the country the tasks of retooling enterprises of our country, we will never accomplish this task. It is necessary to specify clearly the priority directions, taking into account that today enterprises have the opportunity to channel a portion of their assets into some other sector and they are faced with a choice. Therefore, it is necessary to interest them economically in investing their resources in a direction needed by society. In machine building, for example, preference should be given to high-precision equipment, new materials, and electronics.

Now enterprises, having received a portion of the profit at their disposal, are not hurrying to invest it in science and in design development. But if one does interest them in this, the state can thus derive the lacking assets.

It is necessary to develop economic relations and to break through to the world market. Isolationism is of no use. It is hardly possible to talk about competitive ability, if one does not test one's hand in confrontation. In turn, it is necessary to permit similar machine building products to be imported to the Soviet Union, which to a certain degree will contribute to the elimination of monopolism in our country. The step is a serious, but, apparently, very necessary one.

The question of establishing an engineering academy has also become urgent, for today sectorial science for the most part has exhausted its possibilities, it is divided by departmental barriers, duplicates scientific structures, and does not concentrate the cream of engineering personnel and engineering thought.

So that our designers and scientists could create and implement their developments, if only in models, they also need currency resources. Today a large portion of the currency is in the hands of production enterprises. But science is also making a definite contribute to their achievements. Therefore, they also need to have specific, even if modest deductions. Then designers could work more fruitfully and develop a new thing more efficiently. And, of course, it is necessary to introduce immediately new principles of depreciation policy with an economic influence on the updating of equipment. This, undoubtedly, is a very large untapped reserve.

To What Is Priority to Be Given?

In order to visualize clearly what scientific and technical progress will be like and how it is possible to intensify it, it is necessary first of all to know: What will happen with our pricing and what will happen with the credit system? What will the structure of the national economy as a whole be like? President of the USSR Academy of Sciences G. Marchuk raised these questions in his statement.

Let us take pricing. As is known, the entire period of socioeconomic development is broken down conceptually into two periods. The first period is when it is necessary to implement the scientific, technical, and technological reserve. Here for the most part one will have to proceed from the established structure of pricing. The second period is the preparation of the scientific and technical reserve for 1995-2000, when it is necessary to come out with new technologies and equipment and with a new structural apparatus.

Now the basic payments to the budget come from the saving of all types of resources—raw materials, fuel, and electric power—and the saving of labor, and the entire center of gravity of scientific and technical progress in the next five-year plan should be aimed at ensuring their further efficient use. However, resource conservation is proceeding with difficulty. It is unprofitable for enterprises to save resources. But this is problem number one, and it is necessary to solve it without delay.

The financing of science through funds is also advisable. And this has already been started. An impartial commission should allocate money for scientific research on the basis of competition among institutes. The State Committee for Science and Technology should finance and support intersectorial programs. Other organizations should also have funds in order to conduct research on general problems and in the most important directions of the development of science. Then the Academy of Sciences will not have to constantly try to extort money somewhere.

Interbranch scientific technical complexes require special attention. They are of exceptional importance. These are new organizations which do not have equals in any country. Therefore, it is necessary to seek the optimum forms of work of interbranch scientific technical complexes and to think about forming several of them into state scientific technical formations.

The implementation of the Comprehensive Program of Scientific and Technical Progress of the CEMA Member Countries is proceeding with difficulty. In many respects this is connected with the fact that at the very start the socialist countries were unable to reach agreement on a common fund or a common client, from which a firm or institute of any country could order a ceramic engine, a computer, or something else. Everyone relied on his own forces. But not everything worked out. It is necessary to settle these questions.

And about the financing of science in light of territorial cost accounting. Apparently, one must not turn this financing over entirely to the union republics, otherwise after a while all the academies will reduce their potential. Centralized state financing is advisable for any academy, regardless of its location, with allowance made for the orientation of the work and the potential. Moreover, the union or republic government can allocate in addition as much capital as it considers necessary for the development of science. Only then is it possible to boost science locally and to preserve and increase the potential that exists today.

It is necessary to set up strict monitoring of the quality of products, which are being developed and produced, and their technical level.

USSR Minister of Health Ye. Chazov examined an urgent problem. This is the search for talented people and scientists and the creation of the conditions for their activity.

Who determines the financing of this or that scientific research? And why does science, which is connected with the social aspects of the life of man, remain to this day in a downtrodden state? There is no scientific substantiation here. Hence, it is necessary to develop a strategy of financing. Would the Academy of Sciences or other organizations, perhaps, assume this duty and substantiate and forecast advanced solutions?

But even if money has been obtained, there arises the question of how to use it best, especially when it is a matter of academic science and the financing of budget-carried institutes. For there to shut an unpromising laboratory and to divert the money to other problems is an irresolvable problem for the director.

Now, true, new levers are appearing—competition and rivalry. In medicine, for example, 25 expert councils have been established. In MEDITSINSKAYA GAZETA they announced the themes, there was a large competition. However, it then turned out that a number of institutes, even leading ones, did not receive adequate financing to implement their ideas. As a result nothing remains of this competition and rivalry, everything is proceeding according to the former principles of the management of science. Might it be advisable to change over to some contractual terms? A scientific theme, for example, is approved, it is accepted by an expert council, and a competition is announced. An institute recruits people for a specific theme, in order to obtain specific results.

It is also necessary to look in a new way at work with talented scientists and to conclude with them contracts for 2-3, 4 years. And, undoubtedly, such a system—a competitive system, a system on a competitive basis—will lead to the selection of the most talented, interesting scientists. It is also necessary to revise the rights of directors of institutes and scientific councils and to give them much freedom in the distribution of financial assets and their own resources.

In a Union With Production

USSR Minister V. Durasov, first deputy chairman of the USSR State Planning Committee, continued the discussion of the new forms of the integration of science and production and the factors that are hindering their efficient activity. Thus, many scientific production associations have become flagships of production in their spheres of activity. The principle of the close interaction of science and production and work for an end result made it possible to develop unique machines and items, which are competitive on the world market. In nonferrous metallurgy, for example, the Redmet Scientific Production Association in collaboration with other collectives developed an entire range of completely new construction materials and composites, which today are determining the technical level in a number of sectors of the defense industry and electronics. Scientific production associations are justifying themselves as organizational structures, within them collectives can also ensure self-financing, the return from invested assets at times is greater than that of cooperatives.

But to what do the results of the organization of interbranch scientific technical complexes (MNTK's) testify? Many of the 23 established interbranch scientific technical complexes include scientific institutions and are supported by a good production base, priority is being given to them in the provision of instruments, equipment, and production areas. Interbranch scientific technical complexes, of which talented organizers and leading scientists are in charge, have demonstrated their effectiveness. Among them are the Mekhanobr, Nauchnyye pribory, Termosintez, and Mikrokhirurgiya glaza associations, about 10 in all. It is necessary to help several interbranch scientific technical complexes in the launching of work. A state order, which will aid the technical supply of interbranch scientific technical complexes, is specially envisaged in the plan for 1990.

Such a form of the integration of science and production as creative unions of laboratories and institutes of the defense and civilian sectors is also being developed. This collaboration contributed to the assimilation of new composite materials, which were used in the Buran space system. Such laboratories are established for a specific period, the collectives at them are usually small, while the return is frequently higher than that of technically well-equipped institutes, with a larger number of personnel. Temporary scientific cost accounting collectives, which are working successfully on a contractual basis, have also been set up.

If we talk about the successes of scientists, which have been achieved in the union with production workers, it is

necessary to name the method of using low-concentrated sulfurous gases for enterprises of Norilsk, which was proposed by people of Novosibirsk. The solution of this problem is of really revolutionary importance for the improvement of the ecological situation.

But the contacts of science and production could be stronger given their more efficient organization. Scientific production associations, interbranch scientific technical complexes, and laboratories still were established not systematically, but on the initiative of people interested in some directions or others. As a result very important areas of scientific and technical progress were forgotten. This pertains, for example, to electronic engineering. The questions of equipment for the solution of ecological problems have slipped from the framework of interbranch scientific technical complexes and scientific production associations.

In the statements at the meeting it was repeatedly noted that the new forms of management have not yet led to an appreciable increase of the effectiveness of the labor of researchers and developers, but have caused the unfounded increase of the wage owing to so-called contract prices. Their high level also testifies, incidentally, to the fact that there is a large and far from saturated market for scientific and technical products, for which enterprises agree to pay much money. And it is necessary to think not only about how to control the increase of the wage, but also about the quickest meeting of the demand for scientific and technical developments. Continuing this theme, V. Durasov named among the causes of the unsatisfactory use of scientific and technical results the lack of economic interest of production collectives in this. For them the regime of survival has still not been created, the question: Will they be able to exist, if they do not use innovations? is not urgent. Enterprises can also live peacefully with old products. Systems of taxation, incentive tax breaks, and sanctions, which would orient the allocation of assets first of all toward the development of new equipment, do not yet exist. But still the active establishment of scientific production associations in directions, which have been sent down, so to speak, from above, after discussion, of course, with the public, is of enormous importance. Among such directions ecology, resource conservation, and the electronization of production are in the forefront. Large organizations like interbranch scientific technical complexes, which are equipped with the necessary instruments and have production bases, so that the plants included in them would be capable of making both prototypes and small series, are needed.

Foreign Publication Use by Ukrainian Scientists Described

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[Article by N.I. Maloletova, R.L. Krasiy and A.A. Svoboda under the "Improving Efficiency of Scientific Research" rubric: "How Foreign Scientific Periodicals Are Used?"; first paragraph is VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR introduction; underlined passages are rendered in English in the original]

[Text] In order to intensify scientific research, it is very important to constantly improve information service for scientists and professionals and use to their full extent sources of information on S&T achievements, including foreign sources. A comprehensive analysis of the quality of acquisition and use of foreign magazines was performed at the AN USSR [UkSSR Academy of Sciences] Central Scientific Library imeni V.I. Vernadskiy. It helped clarify ways to improve the efficiency of the use of scientific periodicals.

Using the international book exchange and currency appropriations, the AN USSR Central Scientific Library (TsNB) imeni V.I. Vernadskiy performs via the All-Union Cost-Accounting Foreign Trade Association "MEZHDUNARODNAYA KNIGA" centralized acquisition of foreign scientific literature for its own funds and funds of the Lvov Scientific Library (LNB) imeni V.S. Stefanyk and 87 institutions at 6 AN USSR Scientific Centers.

The TsNB and libraries of Republic's academic scientific institutions have a contents-universal foreign literature fund in excess of 4.3 million books. The main source of centralized acquisition is the international book exchange (IBE), which accounts for 53-56

of all foreign books acquisitions.

The AN USSR TsNB has over 65 years experience in the international book exchange. This makes it possible to constantly add new scientific publications, thus providing Republic's scientific institutions with the most up-to-date information on achievements in world S&T progress.

Among the TsNB partners are 1,809 scientific institutions in 70 countries, including 66 Academies of Sciences, 376 universities and institutes, 106 national libraries and 1,236 scientific societies, editorial boards, publishing houses, museums, cultural societies etc.

Under current conditions, when the volume of scientific information is steadily increasing, while information rapidly ages and international book market prices rise, acquisition of foreign literature is getting more complicated by the year. Therefore, systematic evaluation of informational value and effectiveness of foreign publication use becomes a mandatory precondition for making justified decisions on books acquisition. It is very important to correctly estimate whether new acquisitions meet information needs of scientists and professionals.

High scientific quality of selecting and ordering new foreign publications is assured by participation of members of AN USSR Departments' commissions of experts. The commissions were organized in the early 1970s by order of the AN USSR Presidium. They are made up of the most distinguished scientists, and their membership is being renewed periodically. In addition, the commissions are charged with developing recommendations on eliminating duplications and rendering consulting help on foreign literature acquisition etc. to TsNB employees.

Of special importance is the problem of improving the acquisition and use of magazines as the main and most effective source of foreign S&T information. For the last fifteen years, the TsNB has been studying the quality of acquisition and intensity of use of foreign magazines in AN USSR libraries' funds. Since magazines from developed capitalistic countries have the highest scientific potential of all periodicals, it had been decided to study in 1985-1987 the effectiveness of their use.

1,609 magazine titles from 947 organizations in 22 countries that are TsNB partners in the international book exchange were the object of the study. 72 Academic libraries participated in the study. The main objectives of the study were as follows: determine to what degree the magazines meet scientific needs of AN USSR institutions; evaluate their informativeness according to international information-reference publications "Science Citation Index", "Compumath Citation Index" and "SCI. Social Science/Art and Humanities"; compare the selection of magazines received via the international book exchange and those with subscriptions paid for with currency appropriations; identify magazines in heavy demand and those not used. In addition, it was necessary to determine the completeness of magazine funds at each individual institute etc. In the study one used statistical and comparative analysis methods and analyzed planning and reporting documentation and library practices.

The study demonstrated that the majority of magazines come from five most developed capitalistic countries: USA (496 titles), West Germany (194), Japan (190), Great Britain (180) and France (146). As far as the language structure is concerned, the majority of magazines are in English (64), German (15.6) and French (10.7).

The Section of Physical Technical and Mathematical Sciences receives the following number of magazine titles via the IBE: the Mathematics Institute - 71, Electric Welding Institute - 46, and Cybernetics Institute - 39; the Section of Chemical Technical and Biological Sciences: the Zoology Institute - 46, Botany Institute - 43, and Biology of Southern Seas Institute - 40; the Section of Social Sciences: Economics institute - 35, Literature Institute - 33, and Linguistics Institute - 28.

At the same time, the study identified institutes that did not receive magazines from capitalistic countries. These are recently organized scientific institutions - the Problems of Modeling in Power Engineering, Bioorganic Chemistry, Surface Chemistry and some other Institutes.

All in all, scientific institutions of the Section of Physical Technical and Mathematical Sciences receive 551 magazine titles (34.2 of all acquisitions), those of the Section of Chemical Technical and Biological Sciences receive 326 titles (20.3), and those of the Section of Social Sciences receive 231 titles (14.3). The TsNB imeni V.I. Vernadskiy receives 391 titles (24.3), and the LNB imeni V.S.Stefanyk receives 110 titles (6.8).

During the study, AN USSR libraries received 27,833 issues of magazines. During the same time, library readers used these magazines 303,397 times, for the average magazine turnaround of 10.9. All in all, this shows a fairly high degree of the magazines correspondence to information needs of scientists and national economy professionals. During this time, 1,349 magazine titles were requested (83.2 of all the studied titles) at all AN USSR libraries. In the three years, no requests had been made for 260 titles. One also analyzed magazines' composition in terms of their contents and language, the volume of arrivals for each Institute, Department, Section etc.

Results of the study made it possible to trace certain patterns in the acquisition and use of magazines in libraries of AN USSR scientific institutions. In particular, it was found that institutes unevenly use magazines of various industry complexes and subject sections, and that the extent of a magazine use depends on its country of origin.

Nature science magazines are the most actively used ones. They account for 42.3 of all magazine acquisitions, but for 63.6 of total use. In the second place are technical sciences magazines (22.8), followed by social sciences magazines (9.6).

The magazines are used intensively at the Metal Physics, Electric Welding, Physics, Archeology, Strength Problems, and Low Temperatures Physical Technical Institutes. The most passive was magazine use in the Hydrobiology Institute. There were a lot of unused magazines in the TsNB (153) and LNB imeni V.S. Stefanyk (48). Eighteen Institutes (Physical Organic Chemistry and Coal Chemistry, Technical Thermal Physics, Mechanics, Molecular Biology and Genetics, and Industrial Economics Institutes, Poltava Gravimetry Observatory etc.) have low magazine use indices.

Based on use, magazines from the USA came in first. In the second place are periodicals from Great Britain, followed by magazines from Canada and Japan. English language magazines have the highest turnaround. On the one hand, this reflects the world trend in the dissemination of scientific information, but on the other hand, it shows that in this case the readers did not have a language barrier. The volume of magazines published in other languages (Spanish, Norwegian, Swedish etc.) is twice as high as the number of requests for them. The highest percentage of unused magazines come from countries such as Finland, Belgium, Denmark and Australia.

In our opinion, the fact that there is no demand for a large number of magazines fitting the AN USSR profile, which are published in widely used European languages, is due to several factors: insufficient popularization of arriving magazines; magazines were purchased with no consideration given to their use in previous years; scientists were not given sufficient information on new acquisitions, which were not timely reported in library reference materials; and the lack of abstracts and translations of articles from magazines displayed at "New Arrivals" stands.

As a result of the study it was found that in the UkSSR Academy of Sciences 52 magazine titles with the total cost

of approximately 8,000 foreign currency rubles were duplicated in currency subscription and the international book exchange. For instance, the "Physical Review" magazine comes to the TsNB via currency subscription, while the Theoretical Physics and Physics Institutes receive it via the international book exchange. Thus, the magazine arrives in Kiev in three copies, and the annual subscription costs 1,669 foreign currency rubles. The German magazine "Steel Research" arrives in Kiev in four sets - one via currency subscription and three via the international book exchange. It is received by the Strength Problems, Electric Welding, Casting Problems and Problems of Material Science Institutes. In our opinion, the AN USSR Presidium commissions of Experts should resolve the problem of unnecessary duplication. The savings could be used for acquisition of new magazines, thus broadening the selection of periodicals received by the AN USSR. At the same time, it must be noted that coordination does not exclude the possibility of and even the need for duplication in cases of geographic remoteness of Institutes with close profiles. For instance, the magazine "American Sociological Review" is received by the Phylosophy Institute (Kiev), Industrial Economics Institute (Donetsk) and Odessa Branch of Economics Institute; the magazine "Applied Spectroscopy" is received by the Semiconductor Institute (Kiev), Donetsk Physical Technical Institute and Low Temperatures Physical Technical Institute (Kharkov). And this is fully justified.

To evaluate the quality of magazine selection, their informativeness was analyzed using the "Science Citation Index", "Compumath Citation Index" and "SCI. Social Science/Art & Humanities". Of 1,609 magazine titles studied, about 700 (approximately 43) were referenced to in the Indices. (The Indices do not show technology and technical sciences periodicals published by scientific societies, universities and Academies of Sciences).

The comparison of magazines' informativeness according to reference sources to the degree of their use demonstrated that not always there was a dependence between the frequency of scanning a magazine in international sources and its use. However, some science nature magazines that did not show up in referencing Indices had high turnaround. This indicates that they meet readers' needs. At the same time, the Hydrobiology, Biology of Southern Seas, Theoretical Physics, Technical Mechanics Institutes and Donetsk Physical Technical Institute had not used or used very little magazines rated as highly informative.

The main direction of further AN USSR TsNB scientific and practical activity in providing Republic's scientists and professionals with foreign periodicals is goal-oriented work on increasing the informativeness and intensifying the use of acquired publications. Ways to get there are long-term planning of book fund formation based on long-term forecasts of the development of scientific research at AN USSR and implementation of an integrated systemic approach to finding and selecting new foreign publications in strict accordance with subjects of scientific research at AN USSR. It is planned to more actively use members of expert commissions in this work and have them participate in determining the advisability of duplication of certain magazine titles received via currency subscription and the international book exchange, first of all taking into account the level of magazine use at each institution.

The AN USSR Central Scientific Library has already begun working toward more active use of foreign periodicals. Its Scientific Council has developed and approved the "Summary Profile of Centralized Acquisition of Foreign Literature in AN USSR Library System". The Library cancelled 260 magazine titles that arrived via the IBE but had no demand at the AN USSR Institutes. The work on redistribution of magazines that have no demand in some institutions but match research subjects at others continues.

Some rarely used magazines will be converted to the preview information system, with the option to order photocopies of required articles from information centers or via interlibrary exchange.

After moving to the new building, all foreign magazines received by the Library in the last five years will be available in the "Periodicals" section.

The TsNB service department will be able to display at the "New Arrivals" stand all foreign magazines subscribed to by the TsNB and other libraries in the system, including out-of-town libraries. Timely photocopying of reader-requested articles will be organized. Translations of magazines' contents and article abstracting will be used widely, which will help readers to become familiar with new literature.

At present, the TsNB management is studying the feasibility of organizing on the cost accounting basis a translators group that would make translations from difficult European and Oriental languages for scientific institutions and individual readers.

The organization of the translators group within the Foreign Literature Acquisition Department would significantly expand the use of the information potential of foreign publications.

In particular, the Library would be able to organize for AN USSR institutions an analytic list of articles from contents-universal publications by scientific societies, universities and Academies of Sciences, which are now absolutely unsatisfactory stored and used at the TsNB.

The system that informs scientists and professionals about foreign publications not only at Academic institutions, but also at libraries of other systems and agencies, will be improved. New interagency indices and bulletins will be published in cooperation with the USSR Republican Library imeni KPSS [CPSU], Republican Medical Library and Central Scientific Agricultural Library. They will soon be prepared in an automated mode.

The TsNB employees in cooperation with Library Councils of scientific institutions have begun studying causes of unsatisfactory use of highly informative magazines at the

TsNB, LNB and libraries of academic institutions. Preliminary results of the study indicate that one of the main reasons for the unsatisfactory use of foreign magazines at Institutes is decreased interest in the use of foreign information sources on the part of the management of some institutions and Institutes' scientific councils.

We hope that a discussion of the problem of acquisition and efficient use of foreign information sources, conducted at meetings of institutions' Library Councils and the AN USSR Library Council with scientists' participation, will facilitate its successful resolution.

Facts and Numbers

With the creation of the database of AN USSR S&T achievements and the "AN USSR DATA BANKS" database, the first stage of integration of AN USSR information resource has been completed.

A system of selective dissemination of information is in operation at dozens of AN USSR scientific institutions. The system fills inquiries for originals and copies of documents, factual information etc.

An automatic information processing system has been commissioned at the Nuclear Research Institute. The system makes it possible to conduct information search in international and domestic databases.

(Excerpted from the Report on AN USSR Activity in 1988)

Tauson Defends Soviet Basic Science Research

907A0038A Moscow PRIRODA in Russian No 9, Sep 89 pp 3-10

[Article by Academician Lev Vladimirovich Tauson under the rubric "The Organization of Science": "A Word in Defense of Basic Science"; first paragraph is PRIRODA introduction; last two paragraphs are PRIRODA conclusion]

[Text] Lev Vladimirovich Tauson, academician, honorary director of the Institute of Geochemistry imeni A.P. Vinogradov of the Siberian Department of the USSR Academy of Sciences. A specialist in the field of the geochemistry of magma rocks and geochemical methods of the prospecting of ore deposits. Supervisor of a working group for prospecting geochemistry of the International Association of Geochemistry and Cosmochemistry.

The lack of appreciable successes in scientific and technical progress of the country in many respects is governed by the improper understanding of the role and place of science in our society. As A.B. Migdal noted, even the leaders of the country "either do not listen to scientists, select advice, which coincides with their own opinion, or hear people out and act in their own way."[1] One of the causes of this is the continuation of the scarcity of trust, which has been characteristic of our society since the times of Stalin.

Moreover, scientists are more and more often being charged with all the troubles that have descended on our country, especially in the area of economics and ecology. However strange, the negative attitude toward science is being manifested most strikingly among writers, who are now very actively shaping public opinion. An example of this is the statement of S.P. Zalygin at the plenum of the board of the USSR Union of Writers in January 1989. He declared that not only the bureaucratic system, which controls natural resources undividedly, but also science bear enormous responsibility for the formed situation. And then: "In recent times entire academic institutes have found themselves in the pocket of one department or another and have lost their independence. They are the maidservants of ministries. The ministry poses one problem or another, while science substantiates it in retrospect."[2] And there are perceived entirely as a judgment the words from the appeal of the plenum of the board of the USSR Union of Writers to the Academy of Sciences: "The Soviet people trust scientists. But do you not sense that this trust during the years of perestroyka, which are so vital for our fates, is approaching the boundary, beyond which distrust is already beginning?"[3]

From where did this edifying tone and the reproaches come? Obviously, the scarcity of trust and the lack of understanding of the place of science in society, which is connected with it, did not originate today. They are a painful survival of the times, when many scientific schools and even entire sciences were devastated, when the best scientists were physically annihilated. The censure of science, particularly academic science, continued after Stalin as well. Suffice it to recall N.S. Khrushchev, who believed that the tsar needed the Academy of Sciences in its present form, but we do not need it. And this is the opinion of the head of state about the scientists, who developed nuclear weapons and advanced rocketry in, as a matter of fact, a technically backward country!

Since then it has become fashionable, as R.Z. Sagdeyev recently put it, "to wipe one's feet" on academic science.

The author of these lines worked at the Academy of Sciences for more than 40 years. As a scientific secretary he helped A.P. Vinogradov in the organization of the Institute of Geochemistry and Analytical Chemistry imeni V.I. Vernadskiy in Moscow and for more than 30 years was in charge of the Institute of Geochemistry imeni A.P. Vinogradov in Irkutsk. Being acquainted with many research institutions of the Academy of Sciences, I can say with full responsibility that among the academic institutes I know there are no "maidservants of ministries." Yes, many of them did work in close contract with the departments that forged the nuclear missile shield for our homeland. But time has passed, and all of them have returned to basic research. For example, as a witness I can testify that during the busiest years of work on the atomic bomb A.P. Vinogradov conscientiously and voluntarily turned all the scientific forces of the exclusively peacetime Laboratory of Biogeochemical Problems of the USSR Academy of Sciences, which he supervised, toward the analytical service

of the collective headed by I.V. Kurchatov. And he considered it possible to reduce the amount of this analytical work and to launch geochemical research again at the institute only after the job was done. And in general, the Union of Writers should not have applied to all academic institutions the regrettable example of the interrelations of the Institute of Water Problems of the USSR Academy of Sciences and the former USSR Ministry of Land Reclamation and Water Resources.

It can be assumed that the Academy of Sciences soon will also be charged with the slipping of scientific and technical progress in the country. The first cues have already been heard. However, it would do the critics no harm to learn that in spending and the number of employed people academic science accounts for only 5 percent of all science. The lion's share of allocations has been given to so-called sectorial, rather departmental science. Meanwhile, the scientists of the Academy are the most skilled collective of scientific personnel. Here on the average 10-15 percent are doctors of sciences, 50-60 percent are candidates (in sectorial science only 1-2 percent are doctors, while 15-20 percent are candidates). The collective of the Academy can by right be considered the cream of Soviet science. And not only the lack of trust in this leading detachment of scientists, but also the lack of proper attention to its needs on the part of the leaders of the country are all the more insulting.

The old wives' tales about the high wage of scientists do not conform to reality. The average wage at institutes of the Academy comes to 160-170 rubles a month—50 rubles less than for the country as a whole. Highly skilled senior scientific associates, who are candidates of sciences, receive as much as bus drivers, while doctors of sciences can only dream of the wage of bulldozer operators of the Ministry Land Reclamation and Water Resources.

The State Committee for Labor and Social Problems 2 years ago struck scientists a severe blow, having carried out without their consent a so-called wage reform. The funds of qualitative growth of institutes were eliminated, in spite of the fact that they increased the annual wage fund by only 0.25 percent. (A typical example of bureaucratic narrow pedantry!) As a result the management of academic institutes was deprived of the opportunity to increase the wage of scientific associates after their defense of dissertations or for longstanding service. The situation was further aggravated by the fact that the scientific councils of institutes were deprived of the opportunity to influence the selection of scientific personnel.

Today due to the low wage of scientific associates and the lack of prospects of its increase with the increase of skills an outflow of the most capable young people to scientific and technical cooperatives, where for the same work it is possible to receive a two- to threefold larger wage, has begun. While the number of such cooperatives is increasing very rapidly. For example, at the Novosibirsk academy campus in early 1989 there were 137 cooperatives, including 47 scientific and technical cooperatives.

It seems that the government urgently needs to consider the question of the remuneration of the labor of scientists and to make it equal if only to the remuneration of the labor of workers of the highest skills.

It is possible to judge the inattention to the needs of personnel of the Academy from the poverty of the social sphere at academy campuses. In this respect the example of the academy campus of the 6,000-man Irkutsk Scientific Center of the Siberian Department of the USSR Academy of Sciences, at which the author has lived for nearly 25 years, is most revealing. At it more than 1,000 families are waiting for housing. The academy campus is 12 kilometers from the center of Irkutsk. At it there are no movie theater, no sports facilities, no cafe or restaurant, no places for the extracurricular activities of children, and no Pioneer camp, not to mention a house of scientists and a dispensary. And on top of it all the academy campus of the Irkutsk Scientific center is the most starved microrayon of one of the most starved cities of Siberia.

The lack of instruments, which make it possible to conduct research at a modern level, is no less a misfortune of academic science, which ensues from the inattention to its needs. Our industry in the production of equipment for scientific purposes has fallen decades behind industrially developed countries. And if we want to conduct basic research at a modern level, first of all large sums of assets in currency for the purchase of the needed instruments abroad are necessary. Here it is necessary to annually allot institutes specific amounts in currency and to given them the right to accumulate them for the purchase of large-sized and expensive instruments, as well as to spend them freely for the purchase of reagents and spare parts for imported instruments. The amount of 1,000 foreign exchange rubles of the first category per scientific associate a year seems like the minimum. After all, the Americans believe that not less than $100,000 are needed annually for the supply of a single lead scientific associate with instruments. But 1,000 rubles a year all the same are also better than nothing.

At the same time, in connection with the development in our country of scientific centers, which unite several academic institutes, one should also think about common-use pools of imported equipment.

But the fact that neither the leadership of the country nor the public at large understands the functions, tasks, and spheres of responsibility of academic science, remains the main misfortune of the Academy. The generation of scientific knowledge—basic research—always was and will be the basic task of academic science. This distinguishes it in principle from sectorial science, the task of which is applied development: the devising of new technologies and machines and the improvement of old ones, the obtaining of new construction materials and substances. Such a relationship of the goals of basic and sectorial science is generally recognized throughout the world.

In examining the place of science in modern society, it is necessary to understand that the smaller, but the most skilled portion of scientists are employed in basic research.

The larger portion of them are engaged in the application of the scientific knowledge accumulated by mankind—in applied developed.

Here some scientific institutions are usually engaged in the generation of scientific knowledge, while others are engaged in its application. It is advisable to combine this only if it is possible to use the obtained scientific results immediately in science-intensive technology of increased complexity, which is inaccessible to industrial production. As a whole it is illegitimate to require scientific institutions, which are engaging in the generation of knowledge, to simultaneously conduct applied development—this will inevitably lead to the weakening of basic research.

Such demands are also unreasonable for the reason that the scientific institutions, which conduct basic research and applied development, are completely different in structure, personnel composition, scale, and the level of financing.

At scientific institutions, which conduct basic research, the laboratory, in which a small number of auxiliary personnel help a few scientific associates, is the main structural unit. The efficiency of the work of the laboratory is determined first of all by the creative potentials of the associates and their scientific leader—the head of the laboratory, by the skill of the auxiliary personnel, and by the supply with scientific equipment. The research conducted at the laboratory level concludes with the generalization of the obtained data and their publication in the scientific press. Basic research is usually conducted for a long time: it is possible to cite tens of examples which show that major results most often are obtained as a result of long-term and goal-oriented (contemplated, but not planned!) research.

At institutions, which conduct applied development, along with scientific subdivisions and an information service design and technological bureaus, as well as pilot works, which are intended for the development of technological regulations, exist with equal rights. Moreover, in many cases subsidiary production firms, which organize small works that yield significant profits, are established.

It is natural that much more capital and many more people are required for the conducting of extensive scientific and technical development than for basic research. Here, in addition to the scientific associates and the auxiliary personnel who serve them, a significant staff of design engineers, process engineers, highly skilled workers, and economists is needed.

Scientific and technical progress takes the form of the development and use in practice of new technologies, machines, materials, and substances. Therefore, it is customary to regard sectorial science, which conducts applied development, as its main motive force. But the trouble is that all domestic sectorial science long ago was given over to the uncontrolled management of industrial ministries, which transformed it into their own information appendages and "fire brigades," which eliminate the technological and technical hitches at the enterprises of one sector or another. As a result sectorial science, which is called upon to develop new technologies and machines, became, thanks to ministries, departmental science, which combines the functions of plant science, planning organizations, and departmental information centers.

Of course, to some degree it is possible to justify such a transformation of sectorial science by industrial ministries. Given the megalomania and obsolete equipment, which are characteristic of our industry, work on the judicious rationalization of enormous production complexes is necessary. It is impossible to justify another thing: the low qualitative level and the inflated staffs of departmental science, the lack of control of its scientific activity, and, what is the main thing, the absorption of the lion's share of the assets being allocated by the state for scientific and technical progress. (Incidentally, the developments of departmental science, which industrial works need, should have been paid for by the latter from their own assets, and not at the expense of the state.)

Thus, neither academic science nor sectorial science, which was transformed into departmental science, can answer for scientific and technical progress in the country. The main cause of the slipping of scientific and technical progress, which is of vital importance for the success of perestroyka, in our opinion, lies precisely in this.

Academic science cannot but devote main attention to basic research, while sectorial science is forced to focus on the improvement of operating works, which for the present provide the bulk of the gross national product. A question naturally arises: How is one to intensify scientific and technical progress?

In order to answer it correctly, it is necessary to specify what scientific organizations should be like, so that they could carry out with the maximum efficiency applied development which is aimed at the devising of new technologies, machines, materials, and substances. First of all, on no account should they be subordinate to departments, either administratively or financially. At the same time they should have such a structure, with which, in addition to scientific laboratories, design bureaus, sufficiently powerful pilot production subdivisions, information, technical, and economic departments, as well as various cost accounting enterprises, which are capable of producing test batches of a new product, would blend fundamentally.

In our country there are individual institutes (both in departments and at the Academy of Sciences), which in their structure and tasks are similar to such institutions. First of all, these are the Central Aerohydrodynamics Institute imeni N.Ye. Zhukovskiy, the State Optics Institute imeni S.I. Vavilov, the All-Union Institute of Mineral Raw Materials, the Physical Chemistry Institute imeni L.Ya. Karpov, and other institutes, which were established in accordance with decrees of V.I. Lenin and conduct primarily applied development. Owing to fine traditions they have retained to a significant degree the orientation toward what is new, which their organizers—the most prominent scientists and patriots—incorporated in them. Even the omnipotent host ministries could not knock them down from these positions.

To a certain extent the Institute of Atomic Energy imeni I.V. Kurchatov, the Power Engineering Institute imeni G.M. Krzhizhanovskiy, the Institute of Electric Welding imeni Ye.O. Paton of the Ukrainian SSR Academy of Sciences, the Institute of High Temperatures of the USSR Academy of Sciences, the All-Union Scientific Research Geology Institute, the All-Union Scientific Research and Planning Institute of the Mechanical Processing of Minerals, and a number of others, with respect to which the Academy of Sciences "carries out methods supervision," are grouped with the institutions which effectively combine basic and applied research.

The problems of extradepartmental sectorial science have been solved in part in the area of medicine (the Academy of Medical Sciences) and agriculture (the All-Union Academy of Agricultural Sciences imeni V.I. Lenin). However, lacking a technical wing, these extradepartmental sectorial academies are developing with much difficulty due to inadequate supply with modern equipment.

And in general, in our country there is no unified thought-out extradepartmental system of scientific institutions, the main task of which is applied research and the development of new technologies, equipment, and materials. The question of its establishment should be settled without delay.

If we want to accelerate scientific and technical progress, it is necessary to establish immediately an extradepartmental Academy of Technical Sciences, which is directly subordinate to the USSR Council of Ministers. The development of new technologies, machines, and materials, starting with their scientific principles and ending with the technological regulations of new works, should be assigned to the institutions of this Academy. The scientific organizations of the new Academy should work in close contact with the institutions of the USSR Academy of Sciences, of which basic research will remain the main task.

Given the existence of such an extradepartmental system of scientific institutions, which conduct applied development, the government could assign to them the solution of major scientific and technical problems, which are of great importance for the long-range development of the national economy of our country and the CEMA countries.

Having organized the Academy of Technical Sciences, it would be possible to establish under its institutes (or directly under the Academy itself) a series of small enterprises, which operate on the basis of new, high-performance technologies and manufacture products at the level of world standards. Scientific and technical cooperatives could also perform the role of such firms. All of them would constitute competition for our industrial mastodons and would force them to introduce more actively new scientific and technical developments.

The establishment of the Academy of Technical Sciences will not require large additional allocations and can be accomplished in a quite short time. The mentioned departmental institutes, which in level are completely comparable to institutions of the Academy of Sciences, as well as interdepartmental scientific technical complexes can be transferred here. Moreover, several institutes of the defense type could also be included in it. Finally, it would not be bad at a quite high level to revise the inflated state spending on departmental science and change it over to full self-financing and to transfer the freed assets to the Academy of Technical Sciences. All this would make it possible to bridge quite rapidly the gap that has appeared in the country in connection with the imperfection of the structures of the management of science and technology.

But, unfortunately, the central departments, and first of all the State Committee for Science and Technology, decided otherwise. For the elimination of the slipping of scientific and technical progress, which is clear to everyone, they took it into their head to make academic science utilitarian by force. At the end of last year the practice of financing scientific organizations from the state budget, which had existed for decades and had completely justified itself, was abolished by directive. At the same time the changeover to the special-purpose financing of specific programs, themes, and so-called enterprising exploratory research was ordered.

The previously existing system of the planning and financing of science by means of state budget assets envisaged the specification by the Presidium of the USSR Academy of Sciences of the basic directions of the scientific activity of academic institutes, their correction during regular comprehensive checks, as well as the right of the managers of institutes and laboratories to plan annually specific scientific themes within the framework of the approved directions. All this made it possible to conduct long-term basic research, the end result of which only the responsible performer himself and the manager, who are acquainted best of all with the research topic, could foresee.

Such a practice of planning was sufficiently democratic and was based on trust in scientists. But in recent times, when the regulation of the planning and financing of institutes of the USSR Academy of Sciences by superior organizations began, administration by mere decree, monopolism, and voluntarism blossomed in a double color.

Thus, the order of the State Committee for Science and Technology on the distribution of state budget allocations for science is the basis of the new principle of planning and financing. Judging from this document, the Academy of Sciences, its regional departments, and the Academies of Sciences of the union republics have to expand substantially applied development in accordance with state plans of the development of scientific and technical progress (that is, to assume the functions of sectorial science).

At the same time "for the more complete use of the potential of academic institutions" they are being ordered to perform work in accordance with economic contracts with ministries, departments, associations, and other organizations. Thus, not only is a portion of the functions of sectorial science being transferred to the Academy of

Sciences, but its partial transformation into a "maidservant of ministries," the enterprises of which, as the practice of cost accounting shows, are striving to reduce the spending on science to a minimum, is foreordained by the mandatory economic contracts (which make up about 30 percent of the budget).

Incidentally, an applied orientation is also visible in the priority directions of basic research, which at first are formulated by the Presidium of the Academy of Sciences, then are approved by directive organs. In the list of state (academywide) basic research programs their applied sense is easily seen already in the name of the sections. Thus, the only program of the chemical type is called "New Substances and Materials, the Processes of Their Obtaining and Working." The applied emphasis often is also visible in sets of basic research of the regional departments of the Academy of Sciences. An example is the Siberia Program, which is being implemented by the Siberian Department of the Academy of Sciences for the purposes of developing this region. The author is supervising the fulfillment of two of its subprograms and can judge quite competently the share of applied aspects in them.

The possibility of conducting basic research, which is not regulated by directive programs, is confined to the section of enterprising exploratory research. However, it accounts for no more than 30 percent of the state budget allocations that are earmarked for academic institutes. As a whole, given the new procedure of financing applied development in the budgets and plans of academic institutes will amount, apparently, to about 50 percent. In other words, basic research in the country in case of the new procedure of planning and financing will be reduced by one-half.

It is natural that the members of the Academy, who are responsible for the development of the basic sciences, cannot agree to this. First of all, such making of academic science utilitarian will not correct the situation with scientific and technical progress, since regulations of new industrial technologies, series of new machines, and test batches of new materials, which the Academy of Sciences cannot provide, much as it would like to, should be its end result. But, what is the primary thing, this will do irreparable harm to domestic basic research.

In the proposed new procedure of planning and financing considerable attention is devoted to competitive planning. In general, one can only welcome the competitive principle. However, the analysis of the specific situation shows that it is impossible to implement it in practice. Thus, the Academy of Sciences has been ordered to specify the specific theme for each program, to distribute the assets, which have been allocated for their implementation, to select the scientific organizations that are the performers, and to evaluate the obtained results by scientific councils specially set up for this.

But, when conducting such competitions, it is necessary to stipulate "the rules of the game." First, comparable things should be compared; second, the "judges," who conduct the competition, should be, on the one hand, competent and, on the other, objective (if only not interested materially in the results of the competition); third, the assets being distributed should be accessible to all the competition participants. In case of the distribution of the additional allocations, which were earmarked for the Academy of Sciences at the beginning of this year, none of these "rules" was followed. The distribution was carried out mainly by the "supervisors of directions," who took in the lion's share of the allocations, as well as allocated large amounts to the organizations, whose representatives tried to convince them loudest of all of the merits of their programs. As a result institutes of a similar type received subsidies, which differ by nearly an order of 10, moreover, the subsidies to institutions of the capital included a wage fund, while those to outlying institutions did not. (Fears are arising that given such a "competitive system" the fleecing of outlying academic science, the establishment of which came with such enormous difficulty, will occur.)

Finally, the prescribed competitive procedure of the planning and financing of academic science is being complicated by the different sources of financing of scientific institutions of the USSR Academy of Sciences, its regional departments, and the republic academies. As a whole, the conducted distribution showed that the new system leads to monopolization in individual sections of science and the bureaucratization of planning and makes the ability to draw up documents a more important factor than the scientific essence of the proposed programs.

A way out of the formed situation is seen in the immediate formation of new structures of the management of sectorial science, which have been removed from subordination to departments. Only after this will the improvement of the planning and financing of each of the units of science: academic, extradepartmental sectorial, and departmental, become advisable. And scientists themselves should engage in this improvement.

First of all, it is necessary to specify by directive the levels of state allocations for the development of the main units of Soviet science—academic and sectorial. In developed countries 2.5-3 percent of the gross national product (GNP) is allocated annually for science. Taking into account the lag of domestic sectorial science and the fact that 1 percent of the GNP in our country is much less than in these countries, it is expedient to increase the allocations for science to 5 percent of the GNP, which will amount to about 45 billion rubles.

Here, following the example of other countries, 10-12 percent of these assets (about 5 billion rubles), including not less than 100 million foreign exchange rubles of the first category for the purchase of imported equipment, should be allocated for the development of basic research in the area of the natural and social sciences. All the remaining state allocations for science (about 40 billion rubles), which include not less than 1-1.5 billion foreign exchange rubles, should be channeled into the development of extradepartmental sectorial science which is conducting applied development, first of all institutions of the proposed Academy of Technical Sciences, the Academy of Medical Sciences, the All-Union Academy of Agricultural

Sciences imeni V.I. Lenin, and the scientific research sector of higher educational institutions.

It is natural that subsequently the institutes of these academies and their subsidiary enterprises will themselves earn money. Moreover, their material well-being will be strengthened by government orders for the solution of urgent scientific and technical problems. However, the state budget should constitute the basis of their existence.

In the set of tasks of modern science the problems of ecology stand slightly apart. Very much is now being written and said about them. But here the writers and journalists, in whom concern for nature was awakened only in recent years, often forget that scientists, who are now being unjustly accused of inattention to ecology, began much earlier to speak about these problems. Scientists have known for a long time now about acid rains, the hothouse effect, and many other processes that threaten nature. They addressed their warnings both to the executives of departments and directly to the government. But, just as now, silence was the response to all these "attacks" of scientists. It, as S.P. Zalygin correctly noted, is now also stronger than glasnost.

Thus, it seemed to many that the decree of the government on the halt of planning work on the diversion of northern rivers to the south can serve as an example of how the public is stronger than the machinery. But in the draft of the long-term state program of environmental protection and the efficient use of the natural resources of the USSR for the 13th Five-Year Plan and for the future to 2005 in the section of water resources, which was drawn up by the same Ministry of Land Reclamation and Water Resources, three points are the basis of the draft:

—at present the water intake comes to 360 cubic kilometers;

—the water resources of the southern slope of the country are practically exhausted;

—by 2005 the water intake will come to 420-430 cubic kilometers.

But from these "objective" points one conclusion suggests itself: by 2005 an additional 60-70 cubic kilometers of water, which it will be possible to get only from rivers of the northern slope, will be required. Here is the rejection of the idea of the diversion of rivers for you! The public is crying out, while the Ministry of Land Reclamation and Water Resources is remaining silent, is having its own way, and is incorporating the thesis of the necessity of diverting northern rivers in the state ecological program.

Inasmuch as the majority of ecological problems are essentially geochemical problems, the author, who represents geochemistry at the Academy, knows these problems quite well. Thus far the main difficulty in ecology is connected with the stubborn reluctance of the bureaucratic machinery of departments to give anyone access to the materials on the composition of gas and dust emissions and other wastes of industrial works. Even the ubiquitous State Committee for Hydrometeorology far from always succeeds in obtaining these materials. But this is just one aspect of the matter.

On the other hand, when solving ecological problems the objective evaluation of the ecological situation (monitoring and ecological certification), the development of technologies for the neutralization and recovery of harmful wastes, as well as the establishment of production subdivisions, which implement these technologies in practice, are required. Here the complex nature of ecological problems, for the solution of which the efforts of mathematicians, physicists, chemists, biologists, geologists, geochemists, soil scientists, hydrologists, economists, and so on should be united, is appearing in first place.

From just this list of specialists it is already clear that only scientific institutions of the Academy of Sciences and higher educational institutions (universities, polytechnical institutes) can successfully deal with the problems of ecology. The establishment of centers of ecological safety within the Academy of Sciences seems to be the most reasonable form of the organization of work on ecology. They should supervise the ecological programs within large territorial production complexes and organize the work of ecological production subdivisions, which are subordinate to local Soviets, but exist at the expense of the state budget and the departments that are the polluters of the environment.

One of the centers of this kind has already been established in Leningrad. Apparently, in the immediate future the question of organizing similar centers in other ecologically strained regions, and first of all in Eastern Siberia, Central Asia, Belorussia, the Ukraine, and the Central RSFSR, should be settled. Moreover, extradepartmental scientific production associations, which would operate on the scale of the entire country, should be organized for the accomplishment of very important ecological tasks.

There should be allocated to the Academy of Sciences for work in the area of ecology special assets, which it could transfer to the higher educational institutions that are working together with it on ecological problems. Taking into account the extremely tense ecological situation on large territories, the annual allocations for this work during the next 10 years should come to not less than 3 percent of the gross national product, that is, 25-30 billion rubles.

In connection with the applied nature of the bulk of ecological research it seems that there should be left to the Academy of Sciences only this amount of applied development, having relieved it of all others and having thereby freed its forces for basic research.

Time does not wait: if we want to obtain a quick return from perestroyka, it is necessary to achieve the obvious things more quickly. This concerns first of all the main economic problems, the changeover to regional cost accounting, the lease in industry and agriculture, as well as the accomplishment of the task of the maximum acceleration of scientific and technical progress in the country and the organization of the new structures of management, which are necessary for this.

From the editorial board. The article of L.V. Tauson touches upon themes that previously were hardly discussed on our pages, for example, the question of the financing of science in the USSR and the disproportion in the allocations for sectorial and academic science. While respecting the position of the author and appreciating the polemic orientation of his article, the editorial board also plans let speak those who established the existing system of financing. It is also proposed to discuss from different angles the suggestion of the author on the establishment of the Academy of Technical Sciences. The central thesis of the article, in conformity with which one should attribute the slipping of scientific and technical progress in the country exclusively to sectorial science, and by no means to academic science, also seems not indisputable. (Where, then, are the domestic Nobel Prize winners?) And in general, are there grounds to rate exclusively positively the activity of the USSR Academy of Sciences in past decades? Can the Academy in its present form promote the rapid and comprehensive development of basic science?

In other words, the editorial board regards this article as the start of a discussion on the place and role of science in our society.

Footnotes

1. A. Migdal, LITERATURNAYA GAZETA, 4 January 1989.

2. S. Zalygin, LITERATURNAYA GAZETA, 25 January 1989.

3. "An Appeal to the USSR Academy of Sciences," LITERATURNAYA GAZETA, 25 January 1989.

Summary of Perestroyka's Effects on Sectorial Science

907A0051A Moscow NTR: PROBLEMY I RESHENIYA in Russian No 20, 20 Oct 89 pp 6, 7

[Article by NTR: PROBLEMY I RESHENIYA science commentator A. Lepikhov: "The Dead Man Seizes the Living Man. Will Cost Accounting Survive in Sectorial Science?"]

[Text] Let us begin with a quotation. One of the authors of the collection "Postizheniye" [Comprehension], in describing the state of modern Soviet science, writes:

"How often in our country people take pride in the fact that we sell more licenses than we buy abroad. But there is nothing at all to take pride in. The negligibility of the number of purchased licenses testifies to our economic incompetence: it is far more profitable to buy licenses than finished items. The bulk of the loafers and mediocrities in sectorial and VUZ science thus will automatically be deprived of a basis. Many fruitless institutes will go bankrupt. Strictly speaking, we proclaimed this means in the fall of 1987 by the Decree of the CPSU Central Committee and the USSR Council of Ministers on the Changeover of Scientific Organizations to Cost Accounting and Self-Financing. And here sectorial science has already changed over to cost accounting, but nothing has been heard about any scientific institutions going bankrupt. Did they really change their methods that quickly? The secret is simple: inasmuch as in the economy itself full cost accounting for the present is mainly on paper, economic enterprises have no particular reason, just as earlier, to use money sparingly."

So what actual changes have already occurred in sectorial science?

Let us remind our readers that on 1 January 1988 the new mechanism of management was introduced at 1,200 scientific organizations of 23 sectorial ministries. By the end of last year about 800 more scientific, design, and planning organizations had joined them.

It was expected from these 2,000 sectorial scientific research institutes and design bureaus that they would increase the effectiveness of the research and development being conducted, would shorten drastically the time of the development and assimilation of new equipment and technologies, and would ensure a close link between the amounts of the remuneration of labor and the end results of work. A means for achieving these results was also outlined—the increase of the role of contracts, the changeover to special-purpose financing, and the establishment of long-term standards of the distribution of the profit that is derived from the sale of the results of research and development.

In April of this year the USSR State Committee for Science and Technology analyzed the work of the scientific organizations which were converted to cost accounting in 1988.[1] It turned out that the number of contracts, which were concluded by scientific organizations directly with enterprises and associations, increased by two- to threefold, the number of introduced developments increased by 20 percent. The number of developments, which were brought up to the stage of a detail design or were ready for use in production, also increased. On the average the time of the completion of concluded contracts was reduced by more than 19 percent. True, exceptions, as always, lie behind the average figure: four ministries did not reduce this time, while the Ministry of Railways even increased it by 5.6 percent.

According to the data of ministries, the proportion of the jobs, which exceed the world level, came to 12.5 percent of the total amount (in 1987 it came to 11.3 percent), the amount of development, which corresponds to the world level, also increased. The proportion of new equipment in the total output also increased (15.6 percent in 1988 as against 12.4 percent in 1987).

In monetary terms the increase of the amounts of work, which were performed by the scientific organizations which had changed over to the new conditions of management, came in 1988 to about 2.5 billion rubles (a 68-percent increase as compared with 1987).

Only should only be pleased with such a "big leap"—for three-fourths of all the money were obtained by means of intensive factors.

But, unfortunately, it is impossible to believe that all the "earned" money is the "product" of a real increase of the intensity of labor at scientific organizations.

First of all, a portion of it was obtained due to the focus on petty topics—contracts with a small value and a very short time of fulfillment. For example, at the Central Scientific Research Institute of Wool of the Ministry of Light Industry their number increased during the year from 5 to 88 percent.

The second means of obtaining a large profit (and, accordingly, wage) is the setting of too high prices for products, especially design products. In April 1987 a new collection of prices for design work was published. It also became the base of contractual prices. As a result the cost of such products increased by 1.5- to 2-fold. When planning organizations changed over to cost accounting, the prices for designs increased again—increments for the quality, efficiency, and urgency of a job were introduced. In all due to price manipulations the personnel of sectorial science received during the year more than 585 million rubles.

Another method of "earning" is the direct nonobservance of the principle of the leading growth of the scientific, technical, and social development fund with respect to the material incentive fund. Thus, at the All-Union Scientific Research Institute of Construction Power Tools the standard of the deductions to the material incentive fund was established in the amount of 72 percent, at the NATI Scientific Production Association—60 percent, and at the All-Union Scientific Research Institute of Metallurgical Machine Building—57 percent. In this way, according to calculations of the State Committee for Science and Technology, another 250 million rubles were actually obtained illegally. The scientific organizations of our two most criticized ministries—the Ministry of Railways and the Ministry of Civil Aviation—were the record holders in the average monthly payments from the material incentive fund per worker. They managed to increase these payments by eightfold and 16.3-fold respectively!

But to be fair, let us say: for others things are even worse. The increase of the fund for the remuneration of labor at the scientific organizations, which were converted to the new conditions of management, comes to only 8 percent of the total for the country as a whole. (It increased during 1988 by 1.7 billion rubles.)

It seems that the cited figures convince the reader that in our country far from everything is smooth in the sphere of sectorial science. But it would probably be naive to expect that the formation of the new economic mechanism here can proceed without a hitch.

A number of economic steps were formulated in order to countervail the negative trends, about which we spoke above. We emphasize, precisely economic ones.

The procedure of forming the contractual prices for scientific and technical products has also begun to be revised. In short, the correction of the outlined economic approach to the accomplishment of the tasks of scientific and technical progress occurred.

And suddenly there is a 180 degree turn. I have in mind the decision on the freezing of the wage fund, of which Academician L.I. Abalkin was the "father." The permitted 3-percent increase of the fund for the remuneration of labor (with inflation of 8-10 percent) can hardly serve as any stimulus for scientific personnel. Why did we not see the planned "maneuver" through, why is the chairman of the State Commission for Economic Reform drawn so to the administrative order method of solving economic problems?

Indeed, why? It seems that it is possible to get an answer to this question in a work, from which we will now quote an excerpt: "The building of socialism and its development into communism rely on the creative development...of the theory of scientific socialism. This development takes place in the decisive struggle against bourgeois 'theories' of socialism and against the attempts of 'right-wing' and 'left-wing' opportunists to oppose to scientific communism various 'models' of socialism. The right-wing opportunistic distortion of socialism, which received reflection in the theories of 'MARKET' SOCIALISM (emphasized by us—A.L.), is based on the denial of the necessity of a revolutionary transition from capitalism to socialism and of the dictatorship of the proletariat. In these theories...the freedom of the market and competition, the rejection of state regulation of public life, 'nonclass democracy,' and 'freedom' are expounded."

The author of this "passage," alas, is also L.I. Abalkin. Indeed, the past is not giving us an opportunity to step into the future.

Footnote

1. Their work during the first half of this year was not analyzed separately, but was examined by the government of the country at the same time as the result of the activity of the corresponding ministries.

Western Machine Building Journal to Be Available in Russian

907A0052A Moscow NTR: PROBLEMY I RESHENIYA in Russian No 20, 20 Oct 89 p 3

[Advertisement]

[Text] Subscriptions are being accepted for the journal SOVREMENNOYE MASHINOSTROYENIYE, which is being published by the Mir Publishing House.

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